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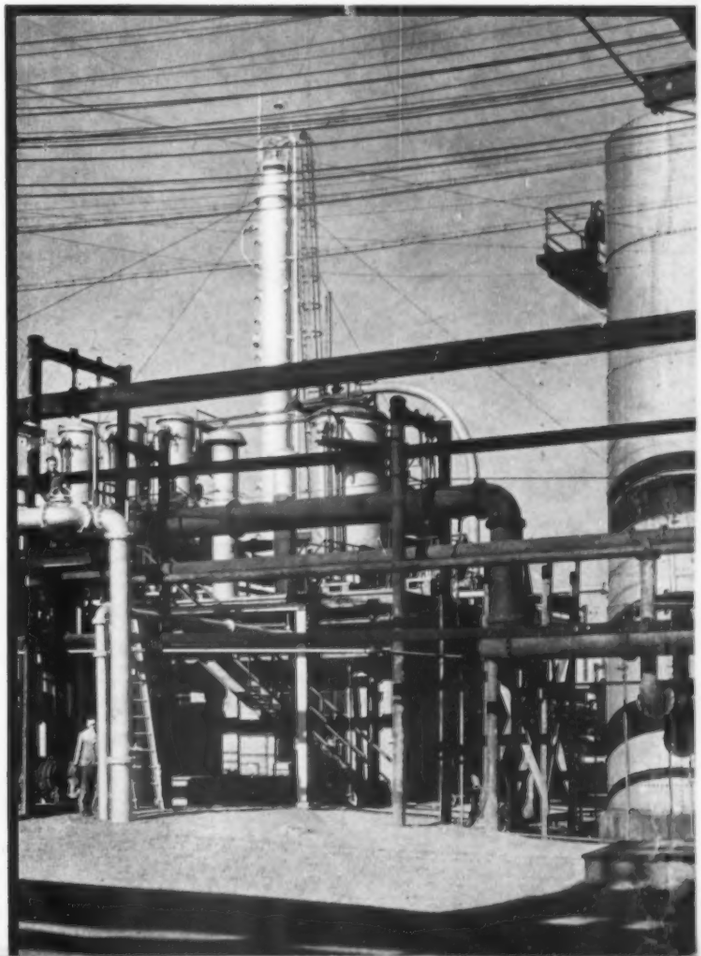

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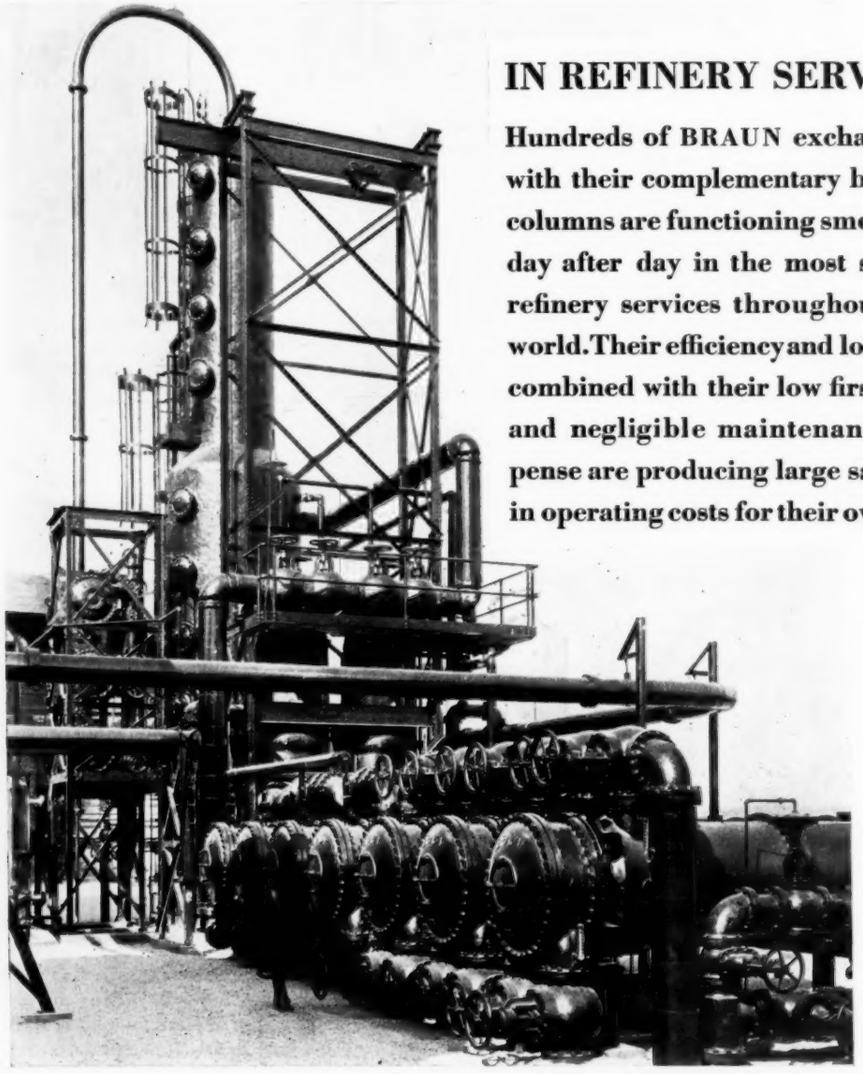

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JULY
1931

WORLD PETROLEUM

(Incorporating "Petroleum Equipment Exporter")

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Cable Address: Ruspam, New York

Executive-Editor, T. Orchard Lisle

Advertising Manager, S. J. Gallay

▼

Great Britain

110 Fenchurch St., E. C. 3, London

Telephone: Mon. 3310

Cable Address, Ruspam, London

European Director, A. C. Hardy

California

Bendix Building, Los Angeles

Telephone: Westmore 9191

Cable Address, Ruspam, Los Angeles

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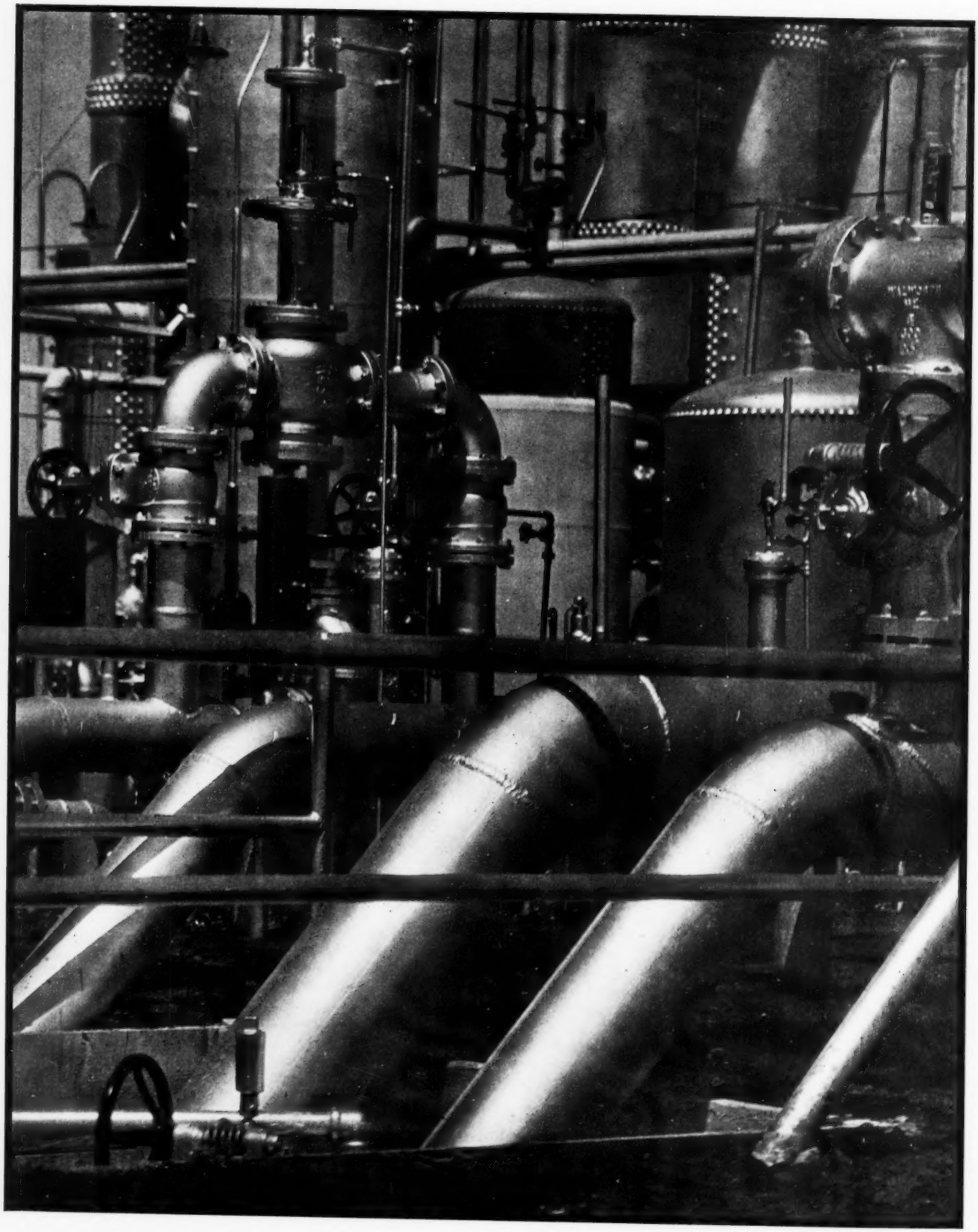

Natural Gasoline Plant, Kettleman Hills, Cal.

Will Connell

NEW YORK • # WORLD PETROLEUM • LONDON

Hurting Everybody

VIOLENT price fluctuations such as accompanied the recent California gasoline war are not limited in their harm to the industry of that section alone, but are costly and injurious to the petroleum business as a whole. When the price of gasoline is nearly doubled or halved over night public confidence in stable values is rudely shaken. Convince motorists that there is no such thing as a rational normal price level and motor fuel will ultimately have to be sold solely on the basis of price. It is difficult to avoid being cynical and pessimistic about any industry which cannot compose its internecine differences in a period such as is now being experienced.

▼

World Refining

CHANGES in economic conditions, new fields and legislative acts are constantly varying the direction of the world flow of oil. These factors combine in influencing the refining situation to the point where there has arisen a decided tendency to erect cracking, topping and blending plants close to centers of consumption. This, however, applies only with qualifications, as for many years to come big refineries located at strategic points along world shipping lanes near sources of crude oil will continue to hold very advantageous positions. But, unquestionably the refining industry is rapidly becoming more international in character, especially because of the desire of many Governments to encourage domestic refining.

Although the United States has the greatest petroleum industry, including more than 400 refineries, more than 36 percent of the world's crude and over 350,000,000 bbl. of refined oils are annually produced in other countries from about 300 plants in operation, including the largest in existence. Considerable refinery development is now taking place in Europe, in the Far East and in the Antipodes. Activity is particularly marked in France, where a dozen new refineries are planned, and in Russia where a tremendous program of expansion is under way.

It is the belief of some prominent international oil men that the greatest future growth of the gasoline market will be in India, China and South America, that Europe also will considerably enlarge its consumption, while growing air services in many countries will bring about an increasingly important demand.

All these factors tend to amplify the importance of WORLD PETROLEUM to the industry in an international capacity and as a forum for discussion of its major problems. This issue is devoted largely to the presentation of a broad survey of the world refining industry, which will be found useful as a record of the principal commercial and engineering developments under way, at the same time visualizing international refinery expansion as a whole.

▼

South African Market

FOR some weeks now the South African press has been agitated over the price of motor fuel. Opinion seems divided as to the cause or necessity of the high prices. The agitation really started when the Union Government increased the import duty on gasoline from three pence per Imperial gallon to six pence per Imperial gallon. The government seemed surprised when the oil companies immediately reflected the extra duty in their wholesale prices. It was the only natural thing for the oil companies to do, as 90 percent of the country's supply is normally stored in bonded tanks and duty paid on a hand to mouth basis.

In Johannesburg the average pump price is the equivalent of 50c per U. S. gallon. The netback to the oil companies, who sell through retailers, however, is nothing like what this figure would seem to indicate. By the time the retailer takes a 16 percent gross profit on turnover, after railage from the Coast of 12½ cents per U. S. gallon is paid, and after the import duty of 10 cents per U. S. gallon is levied—as examples of South African charges—to say nothing of cost of the long haul from far distant source of supply and heavy landing charges, the net return to the importer becomes nominal.

When the oil companies advanced their prices, on account of the duty increase, a veritable "tempest in a teapot" resulted, and the Government talked very seriously of fixing both wholesale and retail selling prices throughout the country. Finally a bill was passed through the South African Parliament, known as the Unlawful Determination of Prices Act This does not in any way fix prices, but in fact does the very re-

verse. It makes it an offense for the Motor Traders' Association—a strong body in South Africa—to maintain an agreed-upon reselling price to the public. Hitherto, this Association fixed what they considered a fair retail price and anyone not selling at that price was put on a blacklist. The Motor Traders would then ask the oil companies to refuse supplies to these price cutters. The oil companies in the past have always cooperated with the traders to this extent as long as they considered the price set by the Motor Traders a reasonable one. Under the new Act that arrangement is unlawful, and retailers can sell at any price they wish to without fear of having their supplies cut off by the oil companies. This means a free market and without doubt the effect of it will be cheaper prices to the public.

Several of the big American and European oil companies have market establishments in South Africa, and there has recently been organized a locally formed company to handle Russian gasoline. The established companies particularly have expended very large sums of money in South Africa in building up good will and extensive facilities for servicing the South African motorist. Expensive bulk installations have been built at all the principal ports of the Union, and subsidiary bulk installations at all interior points of importance. Curbside pumps have been put down in the most remote places in the country, thus insuring reliable supplies of fuel to the motorist. These companies, who are large contributors to the South African Government in the form of taxes paid, give employment to several thousand South Africans and generally are material contributors to the prosperity of the country. It is not surprising, therefore, that many have supported the cause of the bulk distributor, including the SOUTH AFRICAN MOTORIST, which has strongly attacked the Government in its recent action.

The public naturally is interested in motor fuel at the lowest possible cost, so cut-rate Russian spirit of comparatively low grade is being brought into South Africa in small but increasing quantities. However, the specifications of the fuel imported by the Atlas Company (the locally formed South African company) from Russia indicate a lower quality than the established brands on the South African market. Accordingly it will be interesting to see the outcome of the Soviet invasion of the South African field. Certainly it is to be anticipated that the established companies will take all possible steps to protect their already large investments in the country.

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"Colliers" depicts attitude of U. S. A. on imports.

Tariff Question Alive

ALTHOUGH rebuffed in 1930 and 1931 by the last Congress, the Independent Petroleum Association of America still is maintaining an energetic campaign for a tariff on oil. In fact the Association is limiting its activities exclusively to the tariff fight, and hopes to win over the next Congress to its views. If strenuous effort alone were sufficient for success then it would accomplish its aim; but there are many other factors to be taken into consideration. Many business leaders throughout the country, part of the press and a section of the general public, influenced by general business conditions and by retaliations that the Hawley-Smoot act has produced—including a tariff on American gasoline entering Canada—feel that excessive tariff barriers are seriously hampering the return of the world to prosperous times. This, and a presidential election in the offing, will tend to preclude Congressional action placing a customs duty on petroleum. Nevertheless, there is every reason for those oil companies to whom a tariff would mean heavy losses to act to present their side of the case at Washington. Their officers owe a duty to the stockholders to make every effort to protect their heavy overseas investments.

While sympathetic with the mid-contient oil men in their difficulties, which cheap East Texas crude has accentuated, WORLD PETROLEUM has consistently pointed out that a levy on incoming petroleum is far from being a cure for the ills that beset the producing end of the industry. In fact, Venezuela crude now is expensive compared with that from Texas. Suffering serious losses, mainly caused by the indiscriminate drilling of recent years, the tariff advocates have become so ardent that they have almost reached the stage where no other consideration counts but the one objective.

COLLIERS, in a recent editorial, said: "Many Americans are now acting as though we were the only inhabitants of this earth worth considering. We want to sell abroad, but we don't want to buy. We seem to think that by some hocus-pocus trade can be made a one-sided business. Our total exports of oil to the world exceeded imports by $330,000,000 in one year. The embargo advocates want to cut off imports from Latin-America, regardless of the injury which will be inflicted on South Americans. In each case efforts are made to substitute the narrow interests of a small group for the greater welfare of an entire nation."

Development of oil production and refining in fields abroad has been virtually limited to big, well-financed companies because of the enormous investments necessitated, some jungle concessions taking years to attain the commercial output stage. It is significant that virtually all of the development overseas by American concerns was done under the direct encouragement of the Federal Administration. Members of the Cabinet favored such expansion because of its great industrial and political value, and because oil operations abroad helped to place America on a sound footing in world trade and conserve domestic resources. Thousands of Americans hold positions in the oilfields and refineries abroad, vast quantities of American equipment and stores have been and are being shipped, drilling tools and refining machinery exports alone have run as high as $30,000,000 per year. Meanwhile, petroleum exported annually from American oilfields and refineries—including the mid-continent—is valued at approximately $500,000,000, greatly exceeding imports.

WORLD PETROLEUM is strongly opposed to indiscriminate dumping of crude or refined products from other countries at cut-rate prices; but it is doubtful if American oil companies can have recourse to the provisions of the clause relating to unfair practices in importing in the existing tariff law, although the convict or forced labor clause may be applied to any further Russian imports at cut prices. In connection with cut prices it may be noted that Texas gasoline was recently sold to French interests at 3⅝ to 3¾ cents per gallon on tanker at a Gulf port, against Russian Black Sea quotation of four cents. America in her turn must be careful not to be the pot that called the kettle black.

▼

Gulf in Colombia

IT must not be assumed that the enacting into law of the new Barco concession contract will open up the flood gates of Colombian oil to an already overflowing crude oil market. First there will be a thorough geological survey, followed by a period of test drilling to determine the extent of the oil bearing structure, then a difficult pipeline to the sea, roads, terminals, camps, hospitals and possibly a railroad, will have to be constructed. In this mountainous jungle country no waving of a magic wand will accomplish these things overnight. On the other hand, they take years of patient engineering and

planning, so that by the time commercial production is in full swing the world's oilfields will be on a balanced output basis with reasonable prices in force.

That Colombia will not benefit at a time when her finances most need additional oil royalty income is nobody's fault but her own, as conditions were far more favorable for active development in 1924 when President Nel Ospina cancelled the Barco concession immediately after the South American Gulf Oil Corporation purchased the property. Countries whose Governments feel it necessary to protect their natural patrimony by the imposition of complex and uneconomic regulations must leave further exploitation of petroleum resources to later generations when the available supply of oil does not meet the demand. Today oil can be purchased in East Texas at the cost of the royalties payable to South American Governments. President Enrique Olaya Herrera, while understanding the feeling of his own countrymen, is sufficiently experienced in world business to appreciate that exploitation must be made attractively workable to outside capital because of the tremendous risk and enormous outlay involved. It is due to his unceasing and strenuous efforts since he became President of Colombia that the legal fight has been set aside, and the Barco concession returned to its owners under mutually satisfactory terms.

▼

Royal Dutch Report

THE annual report of the Royal Dutch Petroleum Company reached this journal just as the June issue closed for press, leaving no time for adequate study, hence our comment last month was limited to the financial figures. Having international operating facilities, the report of the Royal Dutch Board of Commissaries forms a broad survey of world conditions in the oil industry, the leading countries being discussed individually. Pointing out how the Royal Dutch-Shell group carried out a policy of curtailment in its producing operations in the major fields, reference is made to the difficulties met in inducing other concerns to act in concert. In Venezuela its advocacy of cutting output, made in January, 1930, was not acepted until the following November. In Roumania its plea for conservation was adopted late in July of last year, which improved export prices. For the chaos that later followed the Royal Dutch blames the Steaua Romana, the latter giving notice of termination of the curtailment agreement despite strong urgings by the Royal Dutch-Shell group that it would result in a catostrophe for the Roumanian oil industry. Representations were of no avail as the Steaua Romana remained adamant, and on December 1, the curtailment program came to an end, and overproduction quickly set in, resulting in a drastic drop in prices and virtual ruination for many Roumanian companies, particularly the smaller concerns. As has been reported in WORLD PETROLEUM, Roumania export prices are so much below those of other countries that recently they have proved a greater menace to the European market than all the marketing efforts of the Soviet to date.

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Exports and Imports

IN the first quarter of this year there was a very severe setback in the foreign petroleum trade of the United States. It declined in value from $129,305,000 in the same period of 1930 to $73,092,000. Exports of gasoline dropped in value to $32,795,000, or 52 percent below a year ago. This is largely due to exports of gasoline, naphtha and other like products having declined in quantity to 30 percent below the export volume for the same quarter of 1930. Lower price was the other major factor. Agitation against imports by independent oil men, caused voluntary curtailment of imports in the United States (14 percent for gasoline and 15 percent for crude), and naturally diverted some of the surplus Caribbean crude and refined products to other countries. The latter was a partial factor in reducing exports, as the diversion decreased the demand for American products.

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Canadian Gas

THE position of gasoline prices in Canada since the customs duty of 2.5 cents per gallon was levied commencing last September as retailiation to America's higher tariff, was discussed in our issue for May last. It was shown that the major oil companies absorbed the levy instead of passing it along to the motoring public. Last month agitation arose in the Canadian House of Commons against domestic concerns on the grounds that nothing like the same cut in retail prices had been made in Canada as in the United States, and that oil companies were showing exorbitant profits: also, that Imperial Oil Limited refused to supply one retailer who sold motor fuel at cut rates. If Canadians expect to obtain gasoline near prices now ruling in the U. S. A. they must be prepared to see Canadian oil companies sell their product below cost and suffer heavy losses, an unfortunate situation now existing in the States on a gigantic scale. Is it not better for Canadian business in general to have its petroleum industry built up on a sensible and profitable foundation?

Refinery at Fiume, Italy, of the Raffineria Di Olii Minerali, S. A.

Economic Law Solution Industry's Problem

Comments on Findings of California Oil Survey Committee, Which Under Chairmanship of Mark L. Requa Proposes Outside Board of Arbitration. Greater Solidarity of Opinion Needed.

THE report on the oil situation, particularly in California, recently issued by a group of disinterested business men under the leadership of Mark L. Requa, presents a succinct statement of the difficulties confronting the petroleum industry and offers several suggestions for the solution of those problems.

While exhibiting both brevity and clarity, the report touches all phases of the petroleum business that have given trouble, and states an opinion as to the procedure to be followed on each specific point. Volunteer witnesses representing all branches of the industry appeared at the California Oil Survey Committee's hearings. From their testimony a program was drafted in an attempt to point the way to more satisfactory operations.

Certainly the need for such advice is very great, and this excellent report doubtless will receive careful study on the part of many who are wrestling with the problems that have nearly brought about conditions of demoralization. Unusual interest is attached to the findings of the committee by reason of the fact that Mr. Requa was director of the Oil Division of the U. S. Fuel Administration during the World War, and because of the novelty of undertaking this study by a group of business men not actively connected with the oil industry.

The strength of such reports usually lies in the fresh viewpoint exhibited by men not swayed unconsciously, by their personal or corporate positions. Their weakness is due to the fact that, even if it were possible to inaugurate immediately the proposed remedies, their whole-hearted adoption by all of the conflicting interests in the industry would be a primary requirement.

Oil men are not of one mind, unfortunately, in fixing the blame for the present desperate straits in which they find themselves. By no means are they in unanimous agreement on methods and means of alleviating them. In spite of a fairly general acceptance of overproduction of crude, over-expansion of distributing facilities, hampering restraints in antiquated statutes, world underconsumption, falling off in exports, and the like, as the fundamental causes of the present troubles, the real reason why the problems have not yet been solved obviously is the pronounced differences of opinion among individuals and companies on both the ailments and their remedies.

INTRODUCING drastic artificial means to produce stability out of the present unsatisfactory conditions in the oil industry will not bring about the essential adjustment as quickly as the inexorable law of economics, which ultimately enforces itself, is the opinion of the well-known petroleum economist who has reviewed the Requa Committee report for World Petroleum. The greatest menace to rapid betterment of conditions in his view is the wide divergence of opinions within the industry as to the causes responsible for the existing chaos and the methods necessary to bring about a sound business structure. Some sacrifices will have to be made by individuals and companies and it is better that they be made voluntarily; otherwise the losses will be greater.

On the vital question of crude overproduction for instance, a prolonged debate has been going on in Oklahoma and Texas for several years; but no general agreement on this basic point seems likely of attainment. However excessive the surplus filling-stations appear to many, new ones are being built constantly. Furthermore, the desirability of certain changes in the fundamental law of oil and gas has active antagonists as well as enthusiastic adherents.

It is stated that all the troubles of the oil industry are internal. That is very largely true. Nevertheless, if it is left to the industry to put its own house in order a greater solidarity of opinion must come first; if the solution is imposed from the outside, as by Government regulation, it will be in opposition to so many principles of American business that it will presumably be adopted only as a last resort. It, furthermore, will be resisted by more units in the industry than will oppose any other program. In some of the countries outside of the United States, Government interference in the petroleum industry has not produced desirable results, neither is it likely to in America, especially as Federal regulation means control of every branch,—production, refining and marketing.

During the past two years an increasing amount of discussion has been along the lines of economics, namely the influence of economic laws on the oil industry, their great importance and their application. Here again some very intelligent as well as highly preposterous statements have been made by the various schools of thought. Many lost track of the point that economic laws apply their inexorable influence, independent of their adoption, acceptance, or even understanding on the part of the industry. Matters will eventually become adjusted, whether or not artificial means are introduced; but the goal perhaps could be reached more promptly

and less painfully if it were not for the pronounced disagreements among the oil men along economic lines.

An immense amount of good advice has been offered the industry from various sources. For the most part it only adds to the controversies. Doubtless this was well known to the members of the California Oil Survey Committee when they took up their task. An emphasized suggestion in their report is that the industry might designate temporarily a board, or individual, to render advisory opinions and seek public cooperation, the inference being that the board should be disassociated from the industry.

The question of appointing a "Judge Landis" or a "Will Hays" for the oil business has had consideration before; but it could hardly be expected that the entire industry would agree on the appointment, or even to the idea back of it. To be really effective he, or they, would have to be given dictatorial powers. The oil industry is highly technical and extremely complicated; it is to be doubted if so much authority should be given to anyone without the industry even if that could be done. Ahead of that problem is the question of whether or not a sufficiently large part of the industry would agree. Independents and major companies must first harmonize.

While all these questions are being debated conditions within the industry have been steadily growing worse. Some derive hope from temporary and local price improvements, while others despair that no real attack is being made on the underlying difficulties. In the meantime the much discussed "economics" probably are steadily applying pressure towards the ultimate solution. One would hope that it could be recognized and accelerated, as it will surely come. A basic industry supplying a vital necessity cannot be destroyed.

▼

Problem of World Overproduction

By Sir John T. Cargill

Chairman, Burmah Oil Company, Ltd.

WHAT is the position of the oil industry itself? The problem of the lack of balance between production and consumption has in effect scarcely been touched. World-wide decline in demand keeps grim pace with such efforts as have been made to control production, and the only glimmer of hope of any early improvement which can be pointed to is the negative one that for the greater volume of the world's production today's conditions are ruinous, even although unhappily the truth of this would not appear yet to have got fully home. One need not waste time over academic discussions as to whether the cause of the trouble is over-production or under-consumption. That there is under-consumption for the over-production which is taking place is sufficiently obvious.

Yet despite this obvious fact, all sense of proportion seems to have gone, and one even reads of companies proclaiming, and apparently claiming credit for the achievement, that they have drilled the "deepest well ever known," while they are perfectly aware that all and more than all the production for which there is an outlet could readily, and for some considerable time ahead, be provided easily by the wells throughout the world already drilled and producing.

In the autumn, the increasing disparity between world production and consumption of petroleum caused further falls in values throughout the world, which the market in India could not and did not escape. The published results for 1930 of some of the greatest stalwarts in the industry speak eloquently of the consequences of the wild orgy of production which has been and is still taking place.

We in Burma and India have not participated in this mad and ill-considered development, with its resultant squandering of valuable and irreplaceable resources—for what other description can be applied to a policy which results in drilling several wells where one well would do, and in employing methods wasteful in the extreme of the gas which is Nature's machinery for moving oil to the surface? That we have studiously avoided this sort of thing and have not contributed to the present chaos, preferring a sound policy of development, does not, unfortunately, enable us to escape the consequences, in the shape of reduced values, of the insane race for production elsewhere.

What, however, we do refuse to accept is that this over-production by others should now require us—who have not increased, but have wisely stabilised our production—to reduce our production so as to make room for their overflow in our home markets. Despite a definite setback in India in the demand for kerosene, and a marking of time in that for petrol, we see imports from Russia and America, if anything, greater than before. Imports of the Anglo-Persian Oil Company, Ltd., and the Royal Dutch-Shell group have gradually dropped out to yield to the indigenous production the outlet in India it has required. That margin has now, however, been exhausted, and the time has arrived when we must require other importers of foreign oils to hold back to the extent necessary for India's indigenous production to find its market in India itself.

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British Motor Fuel

ACCORDING to that excellent, old established British journal, THE MOTOR,—"the various branded petrols now available throughout Great Britain have achieved a degree of excellence and consistency, which reflect great credit upon those who organize their preparation, blending and distribution. The British motorist can congratulate himself upon the distinction of being supplied with the world's best motor fuels."

▼

Refining in Egypt

ON the banks of the Suez Canal one of the most up-to-date refineries in the Near East is located. This is the plant of the Anglo-Egyptian Oilfields, Limited, subsidiary of the Royal Dutch-Shell group. It is mainly concerned with the treatment of Egyptian crude produced in the Hurghada field, which amounts to almost 2,000,000 bbl. per annum. In addition about 700,000 bbl. of imported crude is also treated.

At this plant there are six Trumble units, the most modern of which handles all the Egyptian and imported crude. Four of the Trumble units are employed on the manufacture of asphalt from Egyptian fuel and can produce up to 90,000 tons of asphalt a year. The remaining Trumble is used in conjunction with a Dubbs cracking unit for the re-distillation of pressure distillate. This Dubbs plant consists of a Foster Wheeler furnace, a dephlegmator, tower, and two recreation chambers, and was completed early in 1930 to crack waxy residue produced with the asphalt. There is also a continuous distilling bench employed on the manufacture of special products, while a Colas plant is in course of erection. The balance of the refinery consists of an up to date asphalt and lubricating oil drum plant and a tin shop.

Great Refinery Expansion in France

Review of Current and Future Situation. Dozen New Refineries to Be Built, and Several Extensions of Existing Plants.

By E. J. Andre.

PARIS, June

GLANCING backward over the history of the refining industry in France one is given the impression that fate, controlled by the hand of the legislator, has not always been kind. From the outset the different Governments in power lacked the definite policy essential to the welfare of the industry. A protective legislation was enacted with the intention of encouraging refining, only to be withdrawn later. The natural consequence of such a procedure was to hamper efforts of those ready to risk money and devote time in creating a new industry for the country.

In 1864, or thereabout, a few small refineries sprang up under the impulse given by national protection, chiefly for manufacturing kerosene to meet the market demand at the time. Among these refineries the most important were the plants of the Deutsch de la Meurthe, Desmarais Freres, Lille Bonnieres and Colombes, and Fenailles and Despeaux. Later the Cie Industrielle des Petroles built a refinery. So long as legislation afforded protection to these refineries they were able to carry on profitably. With the era of the motorcar the demand for kerosene diminished and consumption of gasoline increased. Existing refineries were not adequately equipped to produce gasoline in any great quantities, so their activity waned. When further legislation in 1915 removed the protection previously afforded, they closed down one after the other.

When France entered the war in 1914 her refineries had been idle for some time. She made the best of a bad business and her somewhat antiquated plants were opened up. Where possible they were modernized, and the gasoline imported from the States was feverishly rectified in order to obtain aviation spirit. After the war was over, and the necessity for a very high grade fuel was no longer urgent, operations in the refineries were again abandoned; especially as competition from imported refined products became too great to enable French refineries to make any real profits. No further protection then being forthcoming, they consequently had to be closed down.

The only refinery which has practically never ceased working since it saw the light of day is that of Pechelbronn near Strasburg. The plant was taken over by the French Government immediately after the war when Alsatia was returned to France by the Treaty of Versailles. The Germans had not destroyed Pechelbronn as they had Courchelettes; on the contrary the oil mines and the refinery had proved a most useful asset during those difficult years.

From 1918 until 1922 very little refining was carried on in France. By that time the S.G.H.P. (Société Générale des Huiles de Pétrole) had rebuilt Paix and Company's refinery at Courchelettes along the most modern lines. At that time it had a capacity of 910,000 bbl. per annum.

The year 1928 brought with it the sensational reform that formed the turning point in the industry's career, namely the vote by the French Parliament to renew protection. From that time on plans for building new refineries continued to mature, and in May, 1929 the S. A. Jupiter inaugurated its important refinery at Petit Couronne.

Protection

SINCE 1928 the existing refineries —Pechelbronn and Courchelettes—have been able to operate on a more favorable basis, as the decrees passed that year granted a protection of Frs. 8.50 per hectoliter of gasoline, and Frs. 330 per ton of lubricating oil. In their operations these refineries naturally benefited from the protection given by the Government.

Import Licenses

ON April 4, 1931, shortly after the ratification by Parliament of its agreement with C.F.P. eleven licenses to import enough crude oil to manufacture gasoline, kerosene, lubricating oils and gas oils in the following quantities were granted, as will be seen by referring to the completely segregated figures published on page 310-311, May, 1931, WORLD PETROLEUM.

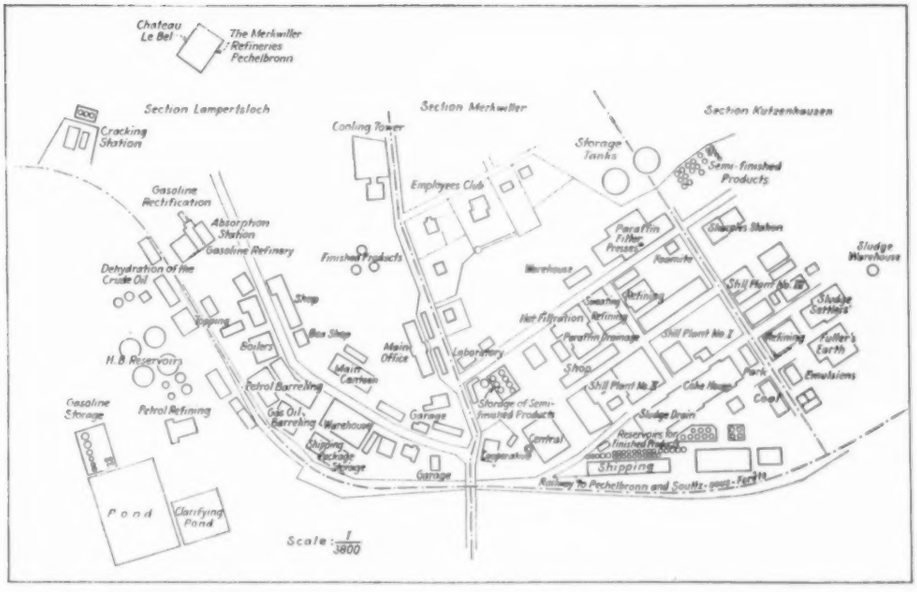
Refinery of the Soc. Gen. des Huiles de Pet roles at Courchelettes

Import Licenses—Total for Four Petroleum Products

	Barrels
Franco-Américaine	4,404,800
Compagnie Française de Raffinage	4,354,400
Jupiter	3,219,100
S. G. H. P.	1,940,000
C. P. C. Berre	1,717,250
Vacuum Oil et C. I. P.	1,634,000
Raffineries de P. du Nord	1,283,300
Raffineries de la Gironde	1,271,800
P. E. N.	928,100
Pechelbronn	838,500
Les Consommateurs de P.	157,500
Total	21,748,750

Let us now see how the foregoing importing companies plan to utilize their licenses, although it is not the policy of any of the beneficiaries to divulge their intentions, or to give the public more information concerning them than they can possibly help.

I have already mentioned that the Pechelbronn, Courchelettes, and Petit Couronne plants, exist. They are modern refineries situated, two in the North and one in the East of France.



Plan of Courchelettes refinery.

Petit Couronne

PETIT COURONNE, owned by the S. A. Jupiter (Royal Dutch-Shell group) is perhaps the largest of the three. It has a refining capacity of about 17,500,000 bbl. per annum. Supplies of crude oil are chiefly drawn from Venezuela, and the refinery has been especially equipped to manufacture asphalt and lubricating oils. It is situated upon the left bank of the Seine 15 km. from Rouen, where the company owns 50 hectares of land. Of these, 16 hectares are occupied by the actual refinery, and three or more by storage tanks. No definite information has been obtainable concerning the number of distilling units actually employed. There are apparently four separate plants in which the distilling operations take place, comprising the usual boilers, evaporators, condensers, heat exchangers, etc.

Lubricating oils are refined in a separate plant; barrels and tins are filled and packing takes place in a building erected for the purpose. Petit Couronne has its own research laboratory, repair shops, warehouses and garages. It is more than probable that the capacity of the refinery will be increased in the near future by the addition of cracking units.

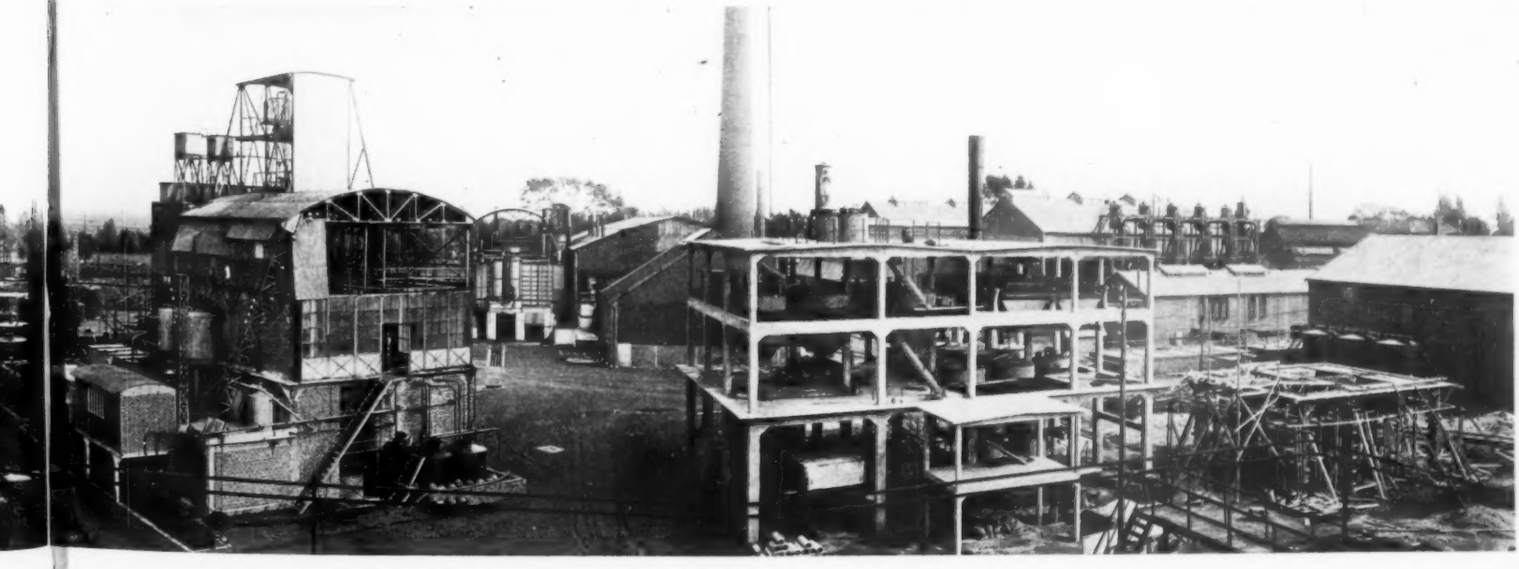
Courchelettes

NEXT on the list of existing refineries comes the Raffinerie de Courchelettes, owned by the S.G.H.P. (Société Générale des Huiles de Pétroles), a subsidiary of the Anglo Persian Oil Company. This refinery was originally heard of in 1865, when crude oil first began to arrive from the United States and was distilled there. Ever since those days the refinery has grown steadily, and always has kept apace with the times.

In 1914, when the North of France was invaded by Germany the refinery was seized and dismantled. Every bit of equipment and machinery that could be of use to the Germans was taken; but it was not until September, 1918, when they began their retreat, that they systematically destroyed everything that remained standing.

It took four years to rebuild Courchelettes; this was successfully achieved in 1922, when a most modern first distillation plant was erected. In 1927 the S.G.H.P. added a complete refining unit, so now is able to produce every category of fuel, motor spirit and lubricating oil. Crude oil supplies for Courchelettes are drawn from the Masjid-i-Sulaiman field in Persia. As this oil is very rich in lighter products it was necessary to erect a "complete refinery."

At present 1,400,000 bbl. of crude oil are refined there annually; but doubtless this quantity will shortly be increased. Storage capacity exceeds 700,000 bbl. Crude supplies arrive at Dunkerque in tankers, where they are



Plant of the Raffinerie de la Gironde at Bec d'Ambes, France, under construction.

transferred into tank cars and conveyed to Courchelettes by rail. Finished products are either dispatched by rail, or water-way, according to their destinations.

Like Pechelbronn and Petit Couronne, Courchelettes has erected its own quarters for the workmen and the staff. These are very comfortable and hygiene plays a prominent part.

Pechelbronn

PECHELBRONN, which also dates way back, unlike Courchelettes and Petit Couronne, is an entirely French concern. It is situated near Strasburg, in the midst of the Pechelbronn oil concession which covers about 40,000 hectares. Crude supplies are mostly drawn from the field itself, and are brought straight to the refinery by pipeline from the different pumping stations. The refinery now employs about 700 workmen, 92 engineers, foremen and other employees, and has an annual capacity of 910,000 bbl.

There are two topping plants at Pechelbronn, plus a Wolf-Carburol cracking unit (German system). The company claims that it obtains the same results with this system as is secured from American cracking systems. The plant has done continuous cracking operations for 105 days.

The Pechelbronn refinery is very complete. Every category of fuel, motor spirit and lubricating oil is obtained. Total storage capacity amounts to 560,000 bbl.; but the company includes in this figure the tanks owned by its affiliates, the S. Alsacienne des Carburants and the S. des Huiles Antar. On the other hand no storage for crude actually is necessary, the Pechelbronn concession forming a natural reservoir.

These are all the existing refineries in France. We will now turn our attention to those that are almost completed, and which will begin refining operations during the course of the next few months, and to the many new refineries that are projected.

Petrole de Berre

THERE is to begin with the Raffinerie de Pétrole de Berre, belonging to the Compagnie des Produits Chimiques et Raffinerie de Berre. This plant is situated on the Etang de Berre, near Marseilles. The company was formed in 1927 with a capital of Frs. 50,000,000, which has since been increased to Frs. 200,000,000. In 1928 a definite refining program was decided upon, and construction was commenced.

At that time the company did not know where it would obtain its supplies of crude oil. The refinery, therefore, had to be equipped for treating any kind of crude, and to produce a complete range of products. In order to do this the directors of the company decided to order some of the equipment in Germany, some came from Czecho-Slovakia, and a certain quantity was obtained in France. What the result of this conglomeration of systems will be remains to be seen when refining is commenced.

At present the planned daily capacity is 7,000 bbl., but it is quite possible that Berre will have eventually a capacity of 3,150,000 bbl. per annum. Official announcement has been made that a Cross cracking unit has been ordered for this refinery.

Gironde (Bec d'Ambes)

THE Raffinerie de Pétrole de la Gironde, situated at Bec d'Ambés, near Bordeaux, was only commenced recently; it is, however, nearly completed. Work has been pushed forward with untiring energy under American engineering supervision. The installation of one Dubbs, and one Cross, cracking unit is almost an accomplished fact, and it is hoped that refining operations will be commenced in July or August of this year. When it is finished the refinery will have a capacity of 21,000,000 bbl. per annum. As will be seen by the accompanying illustration, the storage tanks are already completed. Crude oil for the first runs is being drawn from

Clemenceau refinery at Pechelbronn.

the new fields in East Texas. [The price of this oil is said to have been 10 cents per bbl.—EDITOR.]

Dunkerque

LAST but by no means least among French refineries nearing completion is the Raffinerie de Dunkerque, which is part of the Petrofina group. It is located on the water's edge near the Port of Dunkerque, and has the advantage of having a seaport and a river port of its own. (Canal de St. Quentin.) The site chosen for this refinery, although it has many advantages, has also necessitated a great deal of preliminery work, levelling, draining, etc. Consequently, the actual construction of the refinery has been somewhat retarted.

When work is completed (probably in 1932) the Raffinerie de Dunkerque will have a yearly capacity of 21,000,000 bbl It is to be equipped with a Wolf-Carburol cracking unit, and one topping plant plus an oil distilling plant. It is also to produce a complete line of products.

We now come to the refineries, which have so far only reached the stage of being planned, and will take them in alphabetical order:

Brest:

THE S. A. Brest Port Petrolier, jointly with "Saint Marc," a subsidiary of the S. A. E. M. Pechelbronn, will eventually construct refineries on the same site at Brest.

The first named company has already obtained an authorization from the town council to build storage tanks for heavy oils near Brest, which will be connected by pipeline to a receiving station in the port. Furthermore, it has a concession covering a period of 25 years, of 8,000 sq. meters of land along the wharf, where it is authorized to install additional storage tanks for gasoline and heavy oils. It has a third concession of about 30 hectares along the road leading from Paris to Brest, where the refinery may eventually be constructed.

Although plans are subject to change, the present agreement between Brest and Pechelbronn is that the two refineries will operate in collaboration, using the same power plants, and under supervision of the same personnel in order to reduce overhead expenses.

When construction commences, both refineries are likely to be equipped with cracking and topping plants. As to which systems are to be used is not yet known. A special dock is to be built on the eastern side of the Bay of St. Marc for tankers carrying crude oil to the refineries. This dock will be connected to the entrance of the Port of Brest by a channel with a draught of 23 feet at low-tide. Close to the refinery site the company has a concession of 18 more hectares on which to build storage for its refined products.

Location of refineries and projected plants.

Donges

AT Donges will be located the smallest of all the refineries about to be constructed. It will only be equipped to manufacture gas oil and lubricating oils for companies which are shareholders in the "Consommateurs de Petrole" to whom the refinery will belong; that is to say for five railway companies, five steamship companies and four industrial combines. Donges is about six miles from Saint Nazaire on the right bank of the Loire, but nothing is yet known about its probable equipment.

The "Consommateurs de Petrole" already own storage tanks for their products, which they have hitherto imported, in different cities, such as Rouen, Dunkerque, La Pallice, Marseilles, etc.

Frontignan

FRONTIGNAN, refinery, which was in operation before the war, and is owned by the Cie Industrielle des Petroles, is situated near Sète in the South of France. The existing equipment which is thoroughly out of date is to be scrapped, and an ultra-modern refinery is to take its place, which will be capable of treating 2,100 bbl. of crude a day. (This output may even be doubled later.) Crude oil for Frontignan will be landed by tankers at Sète, where there already are four tanks of a total capacity of 12,000 cubic meters. A pipeline connecting the tanks at Sète with the refinery also already exists; a second one is to be built which will allow for the transportation of refined products from the refinery to Sète for export purposes, or for bunkering ships.

Frontignan refinery is to be equipped to produce all products, cracking plans have not yet been fully decided, but an American company already has received a contract for an atmospheric unit.

Gonfreville and Martigues

ONE of these two refineries will certainly be the most important oil plant to be built in France. They are to be built by the Cie. Française de Raffinage, a combination of six companies (See page 311, June issue), which will eventually have to supply about 40 percent of the oil products sold on the French market.

Crude oil supplies are to be drawn from the Iraq oil fields, conveyed by the forthcoming Iraq pipeline to the Mediteranean, whence they will be shipped to Marseilles.

At present attention is being centered upon Gonfreville, which in all probability will be the larger of the two refineries. It is to be erected in Normandy on land belonging to the Port Autonome du Havre, between the Seine and the Canal de Tancarville, and will be equipped to refine crude from Iraq, as well as other crudes. It, therefore,

will have to be complete in every detail.

The Cie Française de Raffinage has apparently decided to equip both refineries with cracking plants, but information concerning the system to be adopted is still being withheld.

As far as Gonfreville is concerned, arrangements have been made for the tankers to discharge their oil in the outer port of Le Havre, whence a pipeline will convey it to the refinery some 14 km. away. A total storage capacity of 500,000 tons has been planned.

Martigues refinery, to be built on the Etang de Berre, will only be equipped to treat crude oil from the Mosul fields, so will be smaller and more simple. It will cover an area of 60 hectares, as compared with 100 at Gonfreville. A harbor for tankers bringing crude to the refinery is to be built on the Canal de Marseilles, which will considerably simplify the matter of transport.

Lavera

VERY little information has yet been gleaned about the Lavera refinery, which the S.G.H.P. Raf. de Courchelettes (Nord) et Lavéra (B-dw-R) plans to build upon some 120 hectares of land it has purchased at Port de Bouc on the Etang de Caronte (also near Marseilles). Storage tanks already exist there with a capacity of 44,000 cubic meters. It is said that if the refinery is erected, it will be equipped with primary distillation plants and a crackng unit.

Pauillac

NO precise information is yet available concerning Pauillac either. It is to be built by the S. A. Jupiter, and is also to be equipped with a cracking unit. Pauillac is situated on the left bank of the Gironde some 47 km. from Bordeaux.

Port Jerome

THE S. Franco Americaine de Raffinage (Standard Oil Company of New Jersey and other companies) proposes to erect its refinery at Port Jerôme. It will be situated on the bank of the Seine between Le Havre and Rouen, opposite the village of Quillebeuf. A little further down stream a new harbor is to be built, and that is the primary attraction, for the harbor is to be equipped with specail docks for landing crude oil from the tankers, which will come straight up stream to the harbor and from there transported by a 20 mile pipeline to the refinery.

In view of these facilities the S. A. Franco Americaine de Raffinage has secured 185 hectares of land close by; it is also counting upon the improvements planned in the way of enlarging and deepening the estuary of the Seine, which will enable tankers with a draught of 8, 9 and 9.50 meters to come up stream most of the year. Pending these improvements the company has decided to connect its refinery with its receiving station at Le Havre by a pipeline of 30cm. diameter. Crude oil will be pumped through it to the refinery.

Port Jerôme, when it is finished, will be completely equipped to manufacture all products. Primary and secondary distillating plants, and cracking units form part of the companies refining program. All storage tanks are to be protected by means of a foam-type of fire fighting equipment. Housing for the workmen and the staff will be provided for by the company, which has an import license for nearly 4,500,000 bbl. per annum.

The Franco-Americaine plant, which is designed to supply the total requirements of the company's marketing organizations in France, will be constructed according to plans drawn up by the general engineering department, and will be complete and up-to-date in every respect.

Construction will be under the supervision of H. M. Noel, who for the past two years has been assistant to T. R. Parker, adviser to European refining interests of the Standard Oil Company (N. J.). Pipe stills will be utilized exclusively, will be equipped with three 1,000-pound cracking coils, and a complete asphalt unit. Even sulphuric acid has been provided for, a small plant being now in construction adjacent to the company's property. To as great an extent as practicable, construction materrial will be drawn from French sources. It will be in operation early in 1933 and ultimately will use Iraq crude for part of its supply.

Port Jerome (Vacuum Oil Co. S. A. F.)

FINALLY, there is a second refinery soon to be erected at Port Jerôme. It will be owned by the Vacuum Oil Company S.A.F., and built on about 100 hectares of land in the neighborhood already purchased. The company now owns some rectifying plants there, in which it used to treat some of the products it imported from the United States, before disposing of them upon the French market.

Vacuum's refinery naturally will be equipped chiefly to produce lubricating oils. It is said, however, that a cracking unit is projected. [Foster-Wheeler have been awarded the contract.—EDITOR.]

In view of the diversity of lubricating oils manufactured by the Vacuum Oil Company, a great number of storage tanks will be necessary. From 150 to 200 with varying capacities are quoted, but actually everything will depend upon the capacity of the refinery which in all probability will be 3,500,000 bbl. per annum.

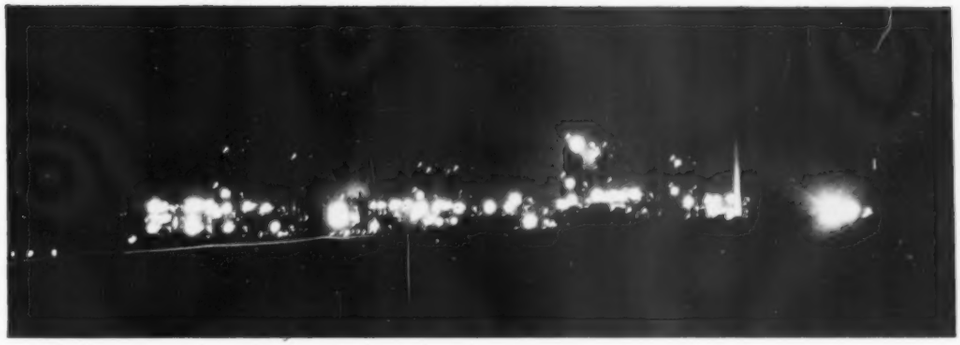
Actual Construction

DOUBTLESS the refineries enumerated in this review will one day materialise. But, since the French Government voted its protective legislation in 1928, ratified its agreement with the C.F.P. in 1931 and finally delivered licenses to import crude oil, the situation of the oil industry has had time to take on a very different aspect. In 1928 enthusiasm was so great that the projected refineries would without a doubt have sprung up in no time, now ardour has been dampened by the difficulties with which the industry has to contend, and all the companies appear to be hesitating as to the best course to adopt.

▼

Refineries in the United States

IN 1859 there were 78 oil refineries in the United States, according to the U. S. Census Bureau. These were mostly very small units, vastly different from modern cracking plants. According to figures compiled by the American Petroleum Institute there was in operation on January 1, 1930, a total of 412 refineries with a daily capacity of 3,765,585 bbl. in addition to eight plants aggregating 37,200 bbl. capacity under construction. Gasoline on which State Tax was paid last year amounted to 351,221,642 bbl., but the total production of gasoline from American refineries is estimated as 436,217,000 bbl. The percentage of gasoline produced from crude has steadily increased from 18.2 percent in 1914 to 42 percent in 1930. The principal products yielded from a barrel of gasoline today are as follows: gasoline, 17.6 gal., kerosene, 2.2 gal., gas oil and fuel oil, 16.9 gal., lubricating oil, 1.6 gal. While only about 8,500,000 bbl. of "cracked" gasoline were produced by refineries in 1918, the cracked output for 1929 was 143,759,000 bbl. Last year the estimated production of cracked gasoline was 164,243,000 bbl.



The old buccaneers of the Caribbean would have been startled by the brilliant sight that Aruba now presents from the sea at night.

Refinery Efficiency in the Caribbean

How the Pan American Petroleum Built In 20 Months One of the Most Modern Oil Refineries At the Crossroads of the World's Ocean Commerce. . . . . . .

WITH vast quantities of crude oil close at hand the Caribbean is destined to play a great part in the world's refining industry. Here the Royal Dutch-Shell have the greatest plant in existence, and an American company has replied by erecting nearby the most efficient refinery. The entire petroleum fraternity has watched with interest the development of the Pan American Company's new electrified refinery at Aruba, because of its demonstration of the latest progress of refining. Through the Company's courtesy, WORLD PETROLEUM is enabled to give on the following pages the first descriptive story. The refinery was visited by the Editor of WORLD PETROLEUM last year when the construction was nearly completed.

WHEN the Pan American Petroleum and Transport Company, through its acquisition of the Lago Petroleum Corporation, found itself in possession of large oil production and reserves in Venezuela, one of the most important problems confronting the company was the selection of a site and the construction of a plant to refine this crude oil for world distribution.

In 1927 a group of the company's officers and technical men surveyed the situation with the view to meeting all problems of refinery construction, harbor facilities, and convenience for transportation in deep draft ocean tank steamers, and proximity to the oilfields. Several locations in Venezuela and Colombia were seriously considered which offered marked advantages from the standpoint of refinery construction and operation, but seemed to offer insurmountable difficulties as regards ocean transportation because of the lack of deep waterways and harbor facilities. One point in Lake Maracaibo, known as Punta Palmas, seemed ideal for the construction and operation of a refinery. There was available excellent foundation on sand underlaid with natural rock. Climatic conditions are ideal and fresh water is available in abundant quantities. Unfortunately from a transportation standpoint serious difficulties would have to be overcome, because the only outlet to the ocean is through a channel approximately eight miles long and only thirteen feet deep. The dredging of this channel to accommodate 28-foot draft steamers was seriously considered, but the nature of the shifting sands and the probable excessive maintenance expense of such a channel discouraged the project.

The island of Aruba, one of the group of the Dutch West Indies, was finally selected. This island is situated off the north coast of Venezuela, 1800 miles south and slightly east from New York City, in west longitude 70° and north latitude 12° 25′. Aruba is approximately the size and shape of Manhattan Island, being twenty miles long and about four miles wide at its widest part. Geologically the island is comprised of an igneous core, around and over which coral deposits have been built up to form a practically flat but somewhat terraced rock desert. There is no fresh water, and only a very small quantity of brackish water, to be found on the island. The average rainfall is about twelve inches per year, or practically the same as that to be found in the western, arid plains of the United States. Even this rainfall, which occurs during the short rainy season from November to January, is ineffective in supporting plant life because the rain quickly runs off the surface or filters down through the porous rock and is lost in the sea. It is doubtful whether any group of engineers ever approached with the idea of building a refinery and community a site less inviting and less encouraging than that presented by the barren coast of Aruba.

It had one outstanding advantage, which in the opinion of those who had to select the site, outweighed all of the disadvantages. At the southeastern end of the island a coral reef existed, about one-half mile off shore. Between this coral reef and the main shore line a deep water bay offered a most excellent opportunity to develop a harbor for deep draft ocean-going vessels. This point, while still 170 miles from the heart of the oil fields in Venezuela, was nevertheless the nearest point to the oil fields

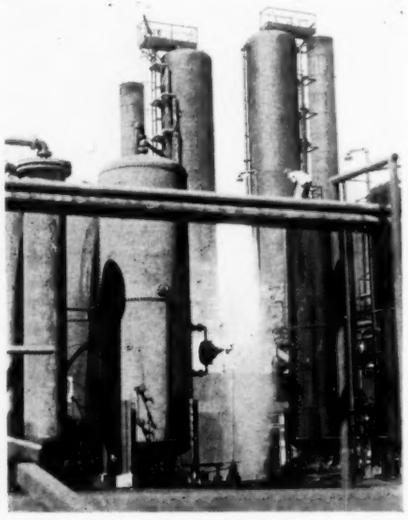
Aruba refinery from the Caribbean Sea.

offering an opportunity for the development of a suitable harbor.

Through the cooperation of the Dutch Government, a long-term concession was granted on approximately 2,000 acres for the purpose of developing the harbor and constructing the refinery. After considerable engineering and reconnaissance work had been completed, the organized effort to dredge a channel through the coral reef, construct a dock, and erect the first oil-storage tanks was begun late in 1927. The channel through the solid coral rock, 200 feet wide, 35 feet deep and nearly a third of a mile long, was finally completed and the harbor opened to ocean traffic in December, 1927. During the interim from this time until the refinery could be completed, the harbor and shore tanks were used as a transfer station through which the crude oil brought from Lake Maracaibo in shallow-draft tank vessels was transferred for reshipment into ocean-going tank steamers. The shallow draft, or "lake tanker," fleet which brings the crude oil from the Venezuelan oil fields to the island of Aruba consists of twenty vessels with a capacity of from 17,000 to 21,000 barrels each. These ships are limited in draft to 13 feet because of the shallow channel separating Lake Maracaibo from the Gulf of Venezuela and the Caribbean Sea. They make the round trip from the oil fields to Aruba in three days or less, depending upon the condition and time of the tides. Full details of the operation of this fleet were published in WORLD PETROLEUM, February, 1930.

The first material for the construction of the Aruba refinery arrived from the United States in May, 1928. The refinery started its first operations in January, 1929.

In the design and construction of the Aruba refinery special attention was given to designing a plant particularly to meet the peculiarities of the crude oil that it was to handle, and the location in which the refinery was of necessity situated. A new type of cracking unit



Separators

was developed to handle the relatively heavy, high-sulphur, oil that was available. These cracking units are a modification of the Cross cracking process, and can be seen in the accompanying illustrations.

Approach to the refinery, showing tankers bringing crude oil and taking away refined products.

Since there was no fresh water available on the island, the plant was designed to be operated entirely by electric power instead of steam power as is general practice. A complete electric power-plant was constructed, with a total capacity of 22,000 kilowatts. Superheated steam at 450 lbs. pressure operates through steam turbo generators and condensers to produce the electric power. In this manner the boiler feed water is recovered as condensate and the required make-up water reduced to a minimum. Diesel engine driven generators were given consideration, but primarily because an available source of steam is necessary as a measure of fire fighting protection, the steam plant was selected with this secondary function in view.

As large quantities of sulphuric acid are required in the process for the removal of sulphur from the finished products, a complete acid manufacturing and restoring plant, with a total capacity of over 200 tons of sulphuric acid per day, was constructed and put into operation.

A number of peculiar conditions had to be met in the design of the refinery because of the characteristics of the crude and the location of the plant. Because of the nature of the sulphur compounds in the crude oil, a new and almost entirely novel process for treating and finishing the gasoline had to be worked out and the equipment designed to meet the new conditions. One of the most important considerations in any refinery is an adequate supply of proper cooling water for condensers. The only water available for this purpose at Aruba was the sea water of the Caribbean. The temperature of this water is almost constant at 85 degs. Fahr. the year round. This required the design

and construction of special distillation and condensing equipment in order that the valuable light constituents of the gasoline might be preserved and condensed under conditions where no temperature below 85 degs. Fahr. was obtainable without artificial refrigeration. To the usual characteristics of warm sea water there were added in this instance the presence of organic acids from decaying animal and vegetable life in the warm Caribbean water, and a further contamination with hydrogen sulphide, the source of which is unknown but probably originates in the sulphur-bearing coral rock. These elements added greatly to the difficulty in selecting and securing materials for condenser tubes and other purposes that would withstand the corrosive action of Caribbean sea water.

By no means the least of the difficulties in constructing the refinery was the problem of securing the necessary skilled and unskilled labor. The native inhabitants of the island are few in numbers, and being of aboriginal Indian extraction are small of stature and entirely unskilled in any of the mechanical trades. For generations they have secured a meager existence from fishing and a few herds of wild goats, supplemented only slightly by agriculture. From among these people only a few unskilled common laborers could be drawn. During the period of construction it was necessary to employ some additional common laborers from nearby islands. All of the skilled labor was secured in the United States. In all more than 1800 American engineers, mechanics, and operators have been transported from the United States to Aruba for the construction and operation of this Caribbean oil refinery.

High-pressure gas reservoirs. About 50 lb. pressure is carried.

There being no food, fresh water, or housing facilities on the island, the problem of caring for the health, comfort and welfare of this large colony of Americans, together with the wives and families of many of them, was one to tax the ingenuity and experience of the organization in charge of the project. More than 250 residences have been constructed, designed along lines best adapted to the climatic conditions, and of various sizes ranging from three rooms to seven rooms to meet the requirements of different families. The materials for these residences were brought almost entirely from the United States. Eight staff houses were constructed to accommodate over 500 unmarried, permanent, American employees. In these buildings the men are housed two in a room, each man provided with his own clothes closet and toilet facilities, with abundant shower baths and other sanitary arrangements. In addition to these buildings, there were constructed a large number of camp units for the housing of employees whose services were required in a less permanent manner during the construction period.

A complete hospital was built, at a cost of over $125,000, including equipment. This hospital is staffed by three

The cracking units are of modified Cross design and incorporate features which give excellent efficiency.

In the heart of the cracking plant

American physicians and surgeons, eight American nurses, besides laboratory technicians, pharmacist, orderlies and kitchen staff. If required, it can accommodate comfortably in excess of eighty patients.

A complete ice manufacturing and cold storage plant was constructed, with cold storage capacity for fresh meat alone in excess of 45 tons, besides provision for fresh vegetables and dairy products. To care for the children of the American employees it was necessary to build two schools. There is also a club house or entertainment pavilion where moving picture shows, dances, musicales, amateur theatricals, etc., are provided for the employees. A commissary store is operated by the company at which employees can purchase at cost all of the necessities of life. In all it was found necessary for the company to expend over $2,500,000 to provide facilities for the health, welfare, comfort and recreation of the American employees in connection with matters which are ordinarily furnished or provided by society at large in the more civilized industrial centers of the world.

Some idea of the magnitude of the problem of caring for this large community of Americans and their families may be gained from perusing a list of the quantities of food alone which are purchased in the markets of the United States and shipped to Aruba. The average monthly quantities of some of the major items are as follows:

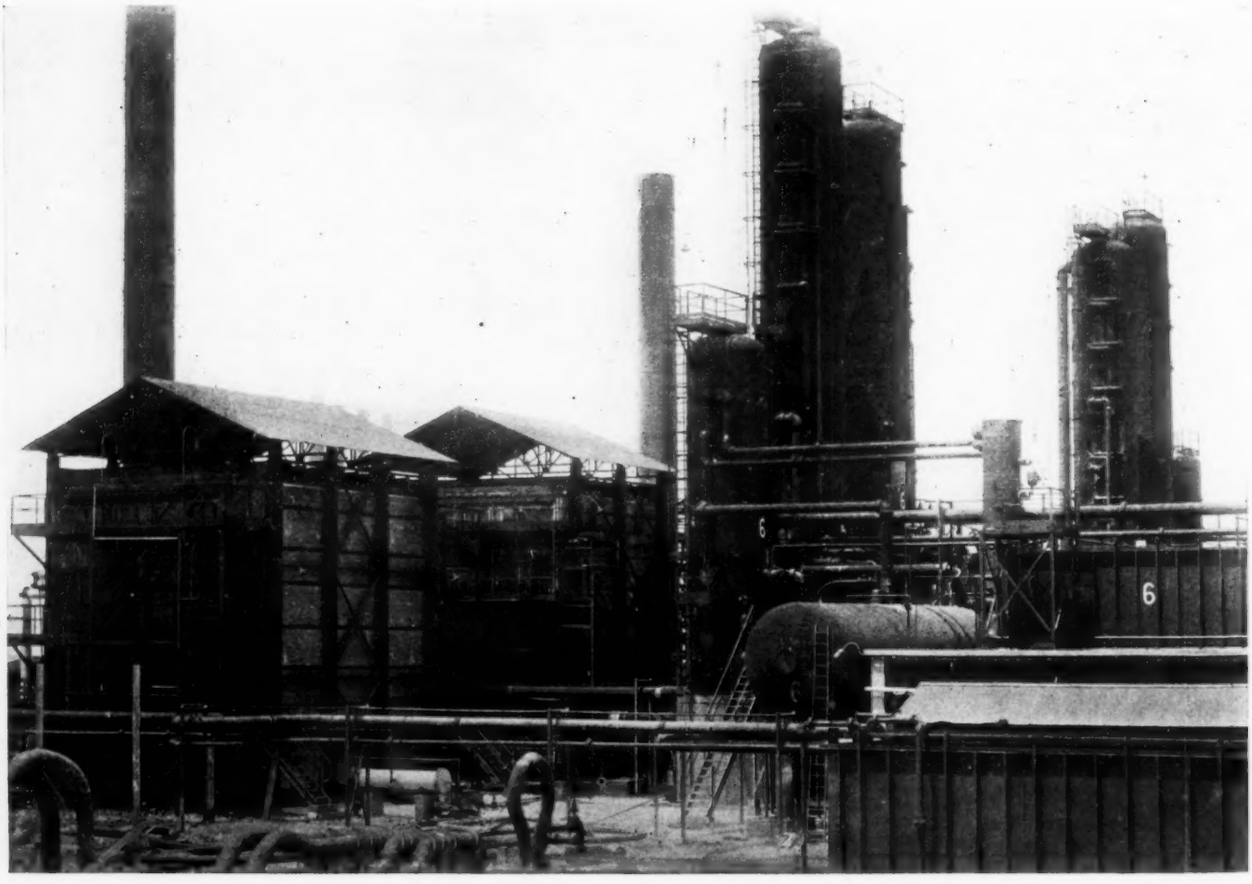
150,000 eggs
60,000 pounds potatoes
28,000 pounds cabbage, carrots, etc.
20,000 pounds green vegetables
50,000 apples
60,000 oranges
40 tons fresh meat and poultry.

One of eight staff houses for single men.

Besides this the company-operated bakery at Aruba produces monthly more than 25,000 loaves of bread, 3,000 pies and over 4,000 dozen cakes, cookies, rolls, etc.

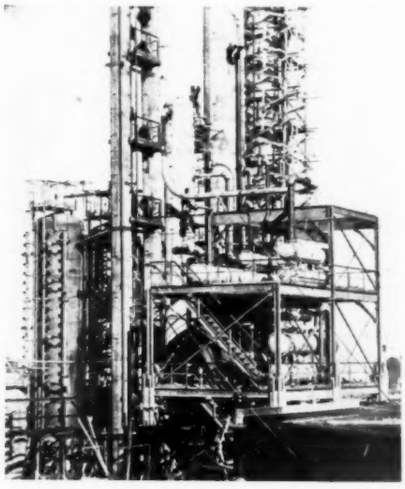
The company transports fresh water

Two of the furnaces and cracking units.



from United States ports (principally Baltimore) in excess of 150,000 bbl. per month for the use of the refinery and community. The community uses more than 15 tons of artificial ice daily.

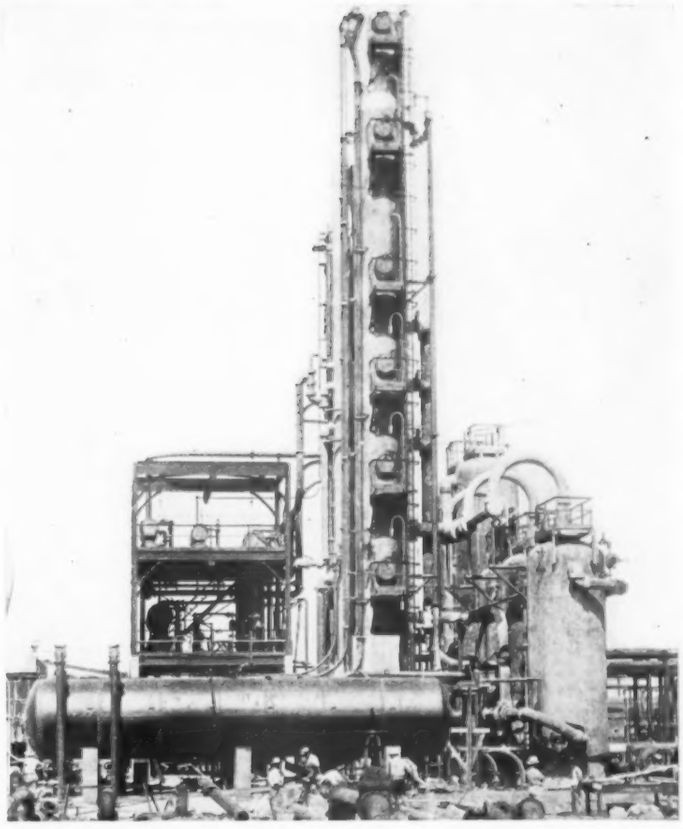
While the planning and providing of these facilities constituted one of the major problems growing out of the selection of a desert island as the refinery site, the results so far have been highly gratifying. The Americans living with their families in the refinery's community are extremely comfortable and content with their situation. There has not as yet been a single death among the American employees and their families resulting directly or indirectly from climatic conditions, tropical diseases, or quality of food and water. An



Construction of stabilizer. (Left)

evidence of the community life existing is found in the fact that 96 American children were enrolled in the two company-maintained schools at the beginning of the school term last fall.

All units of the refinery, including cracking plant, were finally completed and put into operation in December, 1929, less than twenty months from the date of the arrival of the first material.

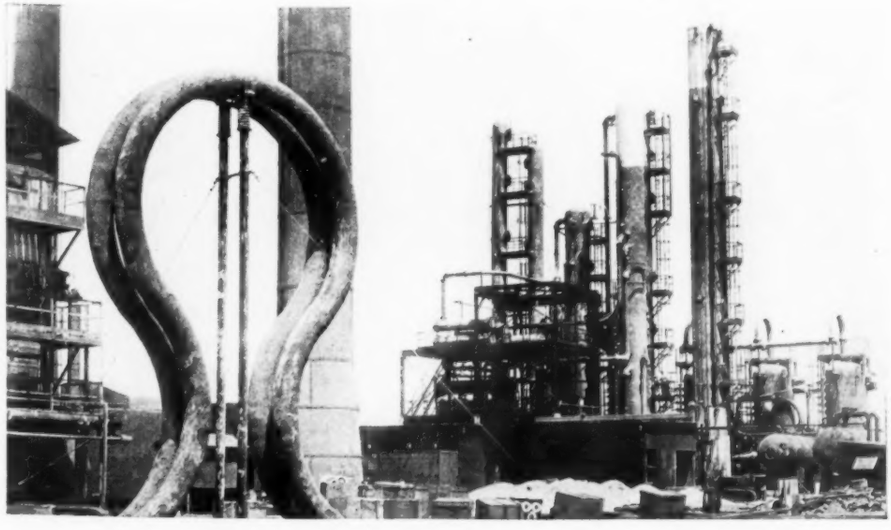


Stabilizer and absorption plant are of very latest design.

The principal elements of the refinery, besides the power plant and acid manufacturing plant previously mentioned, consist of eight cracking units, seven re-running units, three chemical treating plants, four major pump houses, two emergency steam-boiler plants, and tankage with a combined capacity of approximately 5,000,000 barrels. The principal harbor facilities consist of three docks, one at which five shallow-draft lake tankers can be berthed simultaneously, one with provision for berthing two deep-draft ocean-going tankers and four lake tankers, and a third dock for the berthing of gasoline-carrying tank-ships and cargo ships.

The company operates an ocean-going fleet comprising over 35 tankships. These ships transport the finished products of the refinery from Aruba to the markets of the world. In this respect the island of Aruba is admirably situated, being practically at the crossroads of the world's ocean transportation routes. It is but a few miles off the main track of vessels going from the Atlantic seaboard or European ports through the Panama Canal to the west coast of North and South America or to the Orient. It is again but a few miles off the main track of vessels moving from the Atlantic seaboard of the United States to the principal ports on the east coast of South America. Its location is such that from it all centers of world commercial activity can be reached with probably as short an average distance to travel as that from any other location which could be selected any place in the world; hence it is in a singularly strategic position for handling international trade.

The magnitude of this new American enterprise in the Caribbean Sea is more graphically pictured in figures. Within the refinery are pumps capable of handling 100 million gallons of water daily. The number of bricks which went into

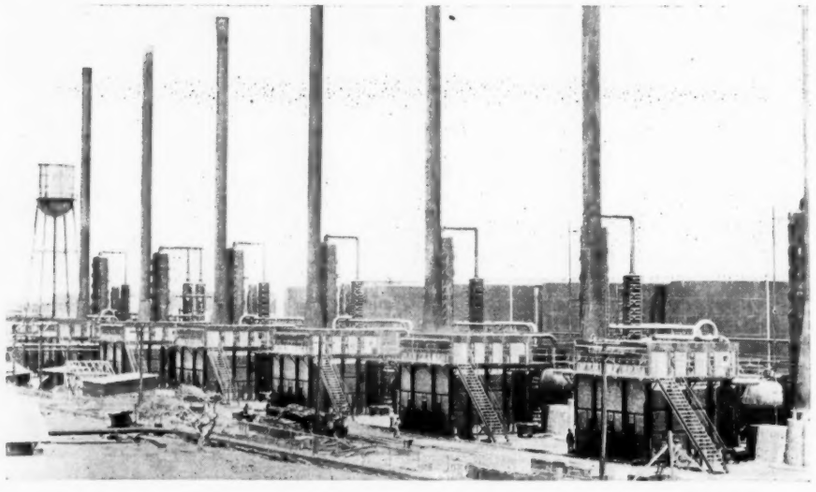


Hot tar lines and stabilizer.

Three doctors, eight nurses and a druggist, all Americans, staff the Aruba refinery hospital.

Trade winds blow night and day on Aruba.

No fewer than 250 houses were built for employees.



Originally seven topping units, this re-run plant was the first part to function.

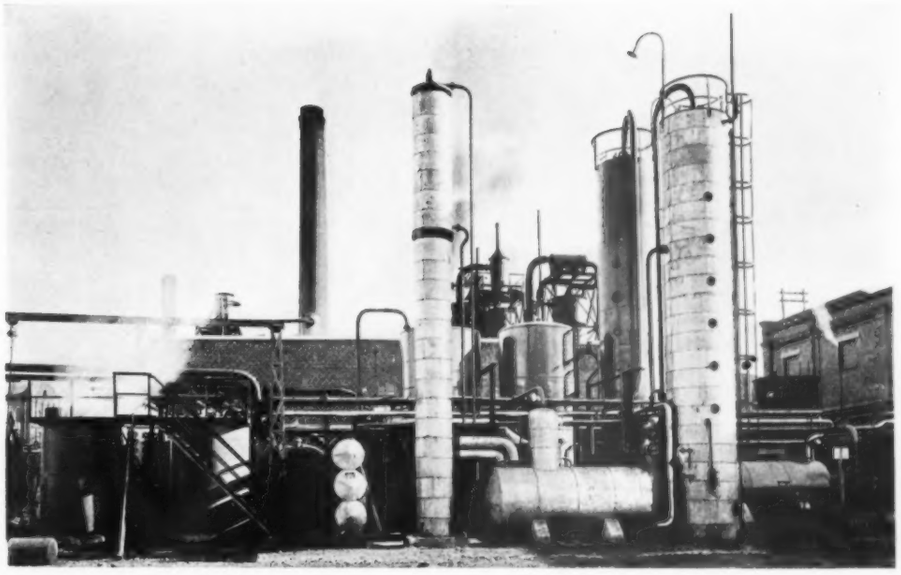
the construction of the refinery elements exceed by nearly 50% the number of bricks used in the construction of the Chrysler Building. Forty thousand tons of crushed rock were used in the cement concrete work, together with another forty thousand tons of sand and in excess of 150,000 sacks of cement. All of the foundations and underground conduits had to be laid in the solid coral rock of the island. To excavate these foundations and trenches over seventy thousand pounds of dynamite were used in more than twenty-five thousand separate charges exploded. Seven million board feet of lumber went into the construction of forms, scaffolds, and permanent buildings. In all more than 135,000 tons of material were shipped to Aruba for the construction of the refinery, an amount equal to the combined displacement tonnage of the steamships EUROPA and BREMEN. Since all of the material was supplied by American manufacturers and contracting companies, the refinery is one hundred per cent American in design and construction.

The developments undertaken by the Pan-American Petroleum and Transport Company in Venezuela and at Aruba have been a response to the recommendations of successive American administrations, that the American oil industry seek foreign fields and develop them for the security of supply to United States consumers, and conservation of American oil resources. The properties in Venezuela from which the crude is produced were acquired from British interests which had in them a great addition to the British world petroleum domain. The company takes pride in the fact that it has at all times co-operated with the American government in its petroleum policy, and by establishment of purely American producing and refining installations off the coasts of the United States and employment of American labor has increased American trade.

It is a significant fact, that shortly before the construction of the Aruba refinery, and while the development of its source of supply in Venezuela was at a high point, the Federal Oil Conservation Board reported:

> "The fields of Mexico and South America are of large yield and much promising geologic oil structure is as yet undrilled. That our companes should vigorously acquire and explore such fields is of first importance not only as a source of future supply, but supply under control of our own citizens. Our experience with the exploitation of our consumers by foreign-controlled sources of rubber, nitrate, potash, and other raw materials should be sufficient warning as to what we may expect if we shall become dependent upon foreign nations for our oil supplies. Moreover, an increased number of oil sources tends to stabilize price and minimize the effect of fluctuating production."

All subsequent reports of the same Board stressed the same theme. The official directors and employees of the Pan-American group take satisfaction in the thought that their productive efforts have been in accord with the wise petroleum policy of their government.



Natural gasoline recovery plant at the Steaua Romana's Campina refinery.

Roumanian Refinery Industry's Problems

Only Plants Modernized During Recent Years Find Themselves in Strong Position to Meet Strenuous Competition from Russian and American Petroleum Products. ***By E. Margulius***

CRITICAL producing and refining conditions lately have made Roumanian marketing operations a menace to the European petroleum price structure. Refining plants of the country are mostly antiquated, lacking cracking units; storage and pipe line capacity is inadequate; and production is excessive. These conditions, combined with under consumption, are forcing products on the international market at cut prices. Almost complete reconstruction of Roumanian refineries will help greatly to put the domestic oil industry on a sound basis, by effecting much needed economies of operation.

BUCAREST, June, 1931

THE present crisis has awakened the Roumanian refining industry, which lately found itself entangled in the vortex of a strenuous competition with American and Russian oil organizations. The wide margin of profit to which Roumanian refineries have been accustomed, is a thing of the past. Only a few refineries in our country have been thoroughly modernised in the last three or four years. These are finding modernisation a blessing. While the refining business was flourishing some of the refineries did not carefully consider or anticipate the future. They now are realising that they will either have to reconstruct their plants—a costly project and difficult to finance today—or give up the fight should general conditions not improve.

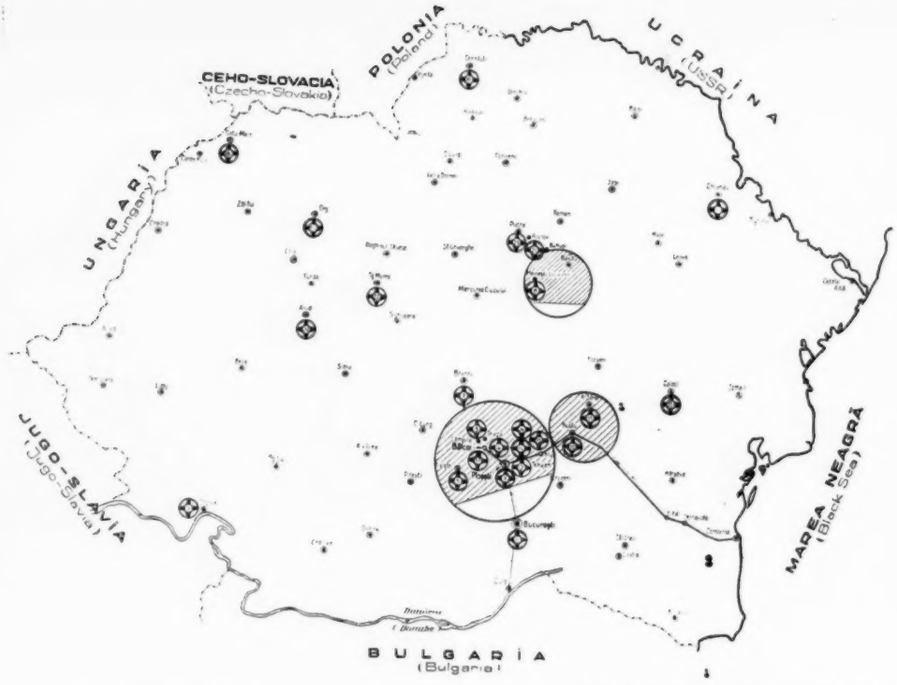
It is the view of several economists in high official and unofficial positions that antiquated plants are not a sufficient justification for sacrifices to be made for the benefit of refiners by either the Roumanian consumer, or the producer of crude.

A short survey of conditions during the last 18 months produces a clarified view of the situation. At the beginning of 1930 international prices were high. In the domestic market the cartel insured an extra 1500 to 3000 lei per car for the refiner.

In spite of these favourable conditions last year, over-production depressed crude prices to ridiculously low figures. While a car of paraffinous crude fetched about 3000 lei the net value of the products derived from it represented something like three times that figure. In July last, the conservation agreement was enforced. Prices of crude rose considerably, and for the first time it was realized that the better equipped refineries were able and willing to pay much higher prices than the others. At those prices the poorly equipped refineries lost, according to their owners' assertions, a few thousand lei per car.

These conditions lasted until both the internal cartel, and the restriction agreement were abandoned. Then the old refineries enjoyed a short breathing period, due to a recurrence of over-production of crude. When production dropped, however, from 2000 cars down to 1675 cars per day, at which figure it stands, these refineries began again to feel the pinch. Owners now bitterly complain that the value of products derived from a car of crude does not cover the price they have to pay for it. In other words, under present conditions, it only pays a "modern" refinery to carry on business.

During discussions which took place with a view to renewing the internal cartel, a proposal was put forward that the entire supply of crude for refineries should be bought through a common office, and that the price paid should be the value of the products derived from the crude, less 2000 lei per car to cover the cost of refining and the amortisation of the plant. The big refineries, with modern equipment, refused this proposal point blank. For them the figure of 2000 lei is excessive, as shown by the prices they are willing to pay for crude at present. They are more interested in maintaining the crude producer alive than in giving bonuses to refiners who



Location of refineries in Roumania.

have not kept pace with modern improvements.

Their attitude implies that better yields, smaller cost of refining, and economy of fuel should be the justifications for the existence of refineries. It is the safer road to a successful fight with the competing forces: namely the well-equipped Russian and American refineries and marketing organizations.

In the accompanying table there is given a complete list of Roumanian refineries with their respective distillation, refining and rectification capacity.

Of these refineries the following have up-to-date plants:

STEAUA ROMANA. *Campina Refinery*

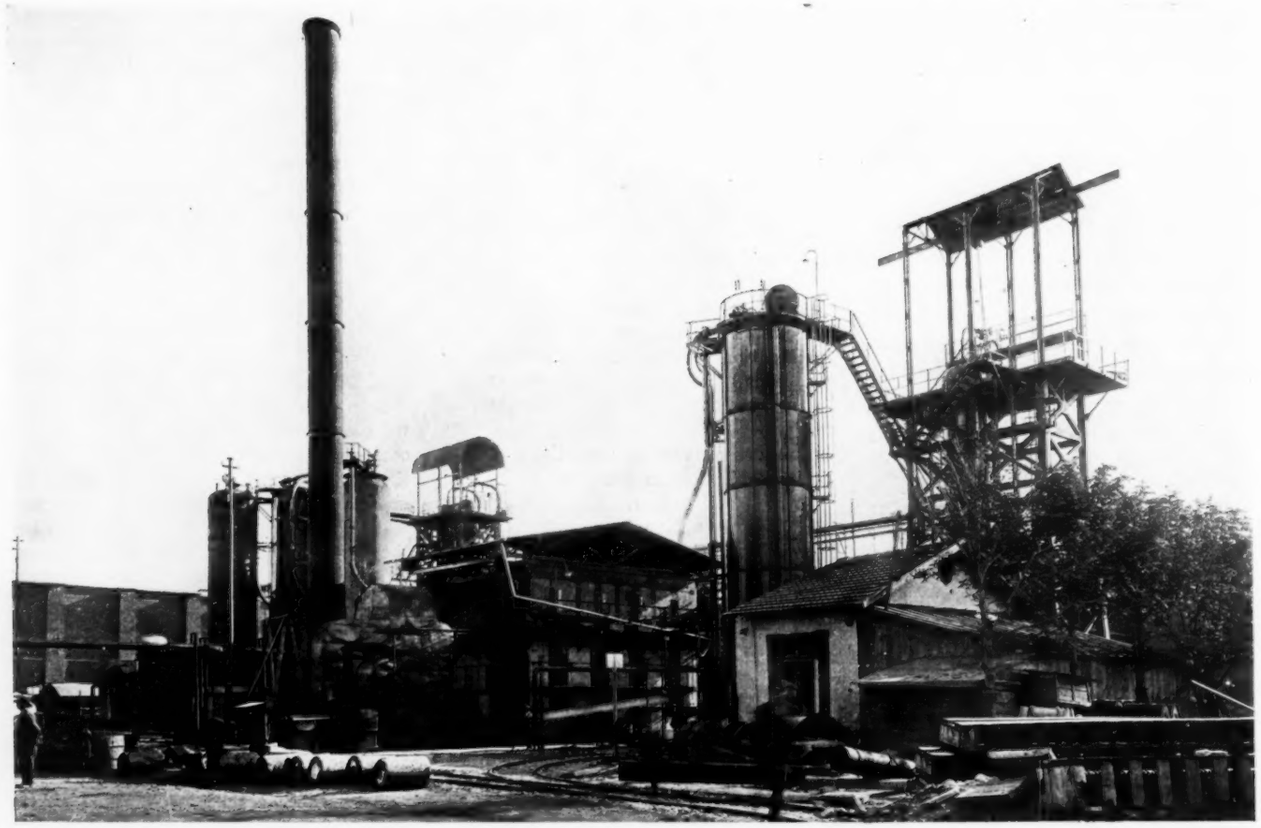
(a) One continuous battery of nine shell stills (11,200 bbl.) With bubble towers.
(b) One Allan plant. With bubble towers.
(c) One Stratford topping plant with three stills (7000-7700 bbl.) transformed from continuous battery. With bubble towers.
(d) Two Dubbs flashing, cracking units.
(e) One continuous lubricating plant (Brunn-Konigsfeld type).
(el.) One discontinued lubricating plant.
(f) Installations for refining kerosene and lubricating oil.
(g) Paraffin plant with refrigerators, (Brunn-Konigsfeld type), and American centrifugal system.
(h) Sulphuric acid installation.

Moinesti Refinery

(a) One Bormann pipe still for paraffinous crude.

ASTRA ROMANA. *Ploesti Refinery*

(a) Two continuous batteries of 12 shell stills, modern equipment with bubble towers and heat exchangers.



Dubbs cracking units at Steaua Romana's Campina refinery.

Dubbs unit of the Colombia Sc. Franco de Petrole.

(b) One continuous lubricating plant (Brunn Konigsfeld type).
(c) Two small asphalt plants.
(d) Five Dubbs flashing, cracking units.
(e) One trumbler with three furnaces for pressure distillate.
(f) One white spirit distillation installation.
(g) Refining installation for kerosene and lubricating oils:
(h) One gasoline plant under construction (for wet gas).

VEGA. *Ploesti Refinery*

(a) An oil non-continuous battery with 12 shell stills with horizontal distillate pre-heaters; approximately 7000 bbl.
(b) One continuous battery of eight shell stills; no bubble tower; about 6300 bbl.
(c) One Bormann pipe still; 5600 bbl.
(d) One Heckmann benzine rectifying plant (six steam stills).

Survey of Refineries in Roumania and their Output in 1930

(Conversion from metric tons. Ratio used given head of column.)

Refinery	Town	Refined during 1930		Light and medium	Non-rectified and heavy	White spirit	Refined and distilled	Gas-oil	Lubricating oils	Fuel oil	Total of products obtained	Oil used as fuel by the refineries	Losses
		Crude oil 7.	Crude gasoline 8.5	gasoline 8.5	gasoline 8.5	8.5	kerosene 7.75	7.75	7.00	7.	in 1930	7.	
Astra-Romana	Ploesti	6,665,288	183,540	1,920,753	519,027	44,370	1,008,857	996,068	258,678	1,688,561	13,285,142	389,417	527,856
Steaua-Romana	Campina	6,189,617	36,584	1,189,311	488,036	169,260	1,268,712	916,801	243,124	1,697,129	12,198,574	260,722	292,677
Steaua-Romana	Moinesti	283,171	.....	33,082	18,368	.....	66,354	26,636	.....	141,764	569,375	11,053	3,990
Unirea and Orion	Ploesti	4,438,000	59,364	795,396	521,849	134,342	794,499	988,666	66,073	1,249,668	9,047,857	249,095	96,152
Concordia "Vega"	Ploesti	4,388,055	.....	623,407	162,273	76,015	935,380	445,508	58,723	2,017,617	8,706,978	233,877	111,013
Romano-Americana	Pl.-Telcajen	3,881,556	127,500	807,534	419,849	102,620	742,760	475,230	55,790	1,393,728	8,006,567	202,370	121,254
Credit Minier "Aurora"	Baicoi	1,964,704	12,138	181,118	211,123	.....	508,858	99,820	.....	952,931	3,930,692	114,961	34,013
Credit Minier "Aurora"	Orsova	170,100	.....	27,707	6,732	170	35,588	22,561	17,542	31,395	311,795	33,306	3,297
Credit Minier "Aurora"	Tileagd	112,224	748	20,876	1,725	1,402	32,285	10,833	4,781	11,270	196,144	27,048	4,592
Credit Minier Fratia	Ploesti	215,040	.....	30,923	10,378	.....	48,253	9,300	.....	100,135	414,029	25,340	3,570
Petrol-Block Standard	Ploesti	2,170,973	.....	259,445	144,140	.....	597,835	216,962	.....	833,819	4,223,174	229,740	39,029
Petrol-Block Saturn	Buzau	173,054	.....	21,122	13,710	.....	42,401	18,166	.....	67,361	335,814	16,618	5,684
Petrol-Block Baneasa	Bucuresti	152,418	.....	24,565	2,040	280	42,742	3,565	.....	68,831	294,441	14,294	4,767
Colombia	Ploesti	1,519,553	.....	260,346	70,482	3,485	379,340	194,587	.....	540,253	2,968,046	138,691	46,312
Rom. Afric. "Xenia"	Ploesti	1,070,958	.....	167,220	64,319	11,220	285,906	103,750	.....	433,958	2,137,331	68,922	16,212
Redeventa	Ploesti	937,790	.....	64,770	151,601	48,339	126,239	73,277	.....	412,090	1,814,106	105,959	21,532
Petrolul Bucuresti	Bucuresti	798,868	.....	152,847	55,122	5,074	201,576	61,022	.....	324,296	1,598,805	48,972	12,964
Cometa	Ploesti	586,509	.....	75,709	28,007	.....	167,207	60,667	.....	232,239	1,150,338	49,049	13,496
Dacia-Rom. Petr. Synd.	Ploesti	558,733	.....	97,724	23,103	.....	144,832	34,992	.....	244,062	1,103,446	43,428	9,317
Petrolmina "Lumina"	Ploesti	497,035	.....	131,182	15,691	5,788	133,007	30,745	.....	175,427	988,875	40,796	6,776
I. Grigorescu S. A.	Targoviste	311,353	.....	45,738	16,167	.....	80,607	24,590	.....	142,282	620,737	18,004	6,468
Carmen-Petrol	Targoviste	302,750	.....	58,995	4,845	.....	62,386	38,719	.....	128,870	596,565	27,251	7,847
Romano-Belg. "Venus"	R.-Sarat	265,125	.....	42,772	11,721	875	100,106	44,416	8,498	41,713	515,226	23,128	13,216
Noris	Ploesti	230,286	.....	22,916	27,667	.....	60,953	19,010	.....	108,129	468,961	4,263	4,011
Luciana	Ploesti	219,681	.....	54,969	.....	.....	54,550	5,580	.....	98,840	433,620	17,493	3,766
Photogen	Brasov	198,457	.....	57,681	.....	48,356	.....	32,381	21,231	13,104	371,210	31,556	8,428
Moldonaphta Danube Oil	Lucacesti	125,055	.....	33,787	2,125	.....	30,983	8,773	.....	43,386	244,109	11,263	4,921
Titan-Petrol	Bucuresti	185,311	.....	44,854	1,997	.....	51,133	17,553	.....	64,190	365,038	16,520	3,976
Ind. de Petr. Fridman	Dej	115,654	.....	22,967	.....	1,105	38,037	10,626	1,267	26,628	216,284	10,781	5,138
"Fratia" M. Solomon	Ploesti	92,974	.....	12,911	8,041	.....	27,955	5,053	.....	32,641	179,575	10,815	1,946
"Pallas"	Galuti	70,259	.....	12,801	3,782	2,125	13,919	11,239	.....	25,638	139,808	4,214	2,233
Petrol-Latina	Ploesti	159,572	.....	19,890	23,069	.....	38,805	10,795	.....	61,264	313,395	15,925	2,205
Fratii Niculescu Ciufu	Targoviste	73,297	.....	21,802	.....	.....	18,793	7,330	.....	22,652	143,874	7,616	1,477
Heinrich Steinberg	Brasov	70,644	.....	20,417	3,833	.....	21,738	8,717	.....	16,583	141,932	5,201	1,407
Coroana S. A.	Mizil	63,714	.....	12,308	3,332	.....	17,174	6,937	.....	20,755	124,220	7,021	1,281
Helios	Targoviste	54,271	.....	12,384	1,657	.....	14,966	6,300	.....	14,949	104,527	7,525	1,029
Uranos (I. Mandel)	Ploesti	42,042	.....	11,883	.....	.....	12,269	3,737	.....	11,214	81,145	5,453	1,134
Petrolul Bucovinean, Rohozna-Cernauti		36,946	.....	12,614	374	.....	11,732	3,448	21	8,232	73,367	3,507	777
H. Blum	Margineni	15,491	.....	.....	2,133	.....	4,316	2,311	.....	5,467	29,718	1,540	630
Victoria (Petrolifera)	Targoviste	16,450	.....	.....	3,825	.....	5,425	1,705	.....	3,955	31,360	2,310	595
Fratii Freund	Satu-Mare	15,490	.....	1,207	.....	.....	5,215	4,030	.....	2,632	28,484	2,037	1,386
M. Haimsohn	Moinesti	10,647	.....	85	875	.....	3,703	3,014	.....	1,449	19,773	1,750	539
I. Berman	Bucovat-Chisinau	9,912	.....	2,329	.....	34	920	861	.....	3,962	18,018	2,128	266
Leon A. Leibu	Adjud	9,261	.....	.....	799	.....	2,301	1,271	.....	1,407	15,039	3,605	336
C. Haimsohn	Buhusi	6,790	.....	.....	1,241	.....	2,845	2,008	.....	945	13,829	98	238
Rad. de Petrol din	Tg. Mures	6,601	.....	1,164	.....	382	1,092	930	2,240	.....	12,409	420	210
Alter Schwarz	Lucacicsti	4,914	.....	.....	476	.....	1,719	999	.....	.....	8,108	1,764	301
Alik Leibu	Moinesti	4,795	.....	.....	314	2,354	668	.....	1,792	.....	9,923	147	56
B. Scheffler	Moinesti	3,507	.....	.....	263	.....	1,264	751	.....	14	5,799	1,288	168
H. I. Bernstein	Moinesti	10,479	.....	1,853	.....	.....	3,548	.....	2,037	735	18,652	2,464	420
Nathan Silberman	Moinesti	1,876	.....	.....	229	.....	644	799	.....	28	3,576	266	91
Dr. Smarack	Roznov	38,500	.....	.....	8,500	.....	8,370	3,410	.....	17,640	76,420	1,750	1,470
Petrolul Buzau	Buzau	11,606	.....	.....	2,660	.....	4,650	775	.....	651	20,342	3,220	560
N. V. Clo Cardel	Matita	2,065	.....	297	.....	.....	768	.....	.....	819	3,949	238	70
Bitumul Matitza	Matita	2,464	.....	586	.....	.....	813	131	.....	693	4,687	385	49
TOTAL		39,561,795	419,874	7,414,247	3,057,500	657,596	8,266,998	5,077,355	741,797	13,538,046	78,735,208	2,564,604	1,453,158

(e) One French rectifying plant.
(f) One lubricating plant, old system.
(g) Refining installation for kerosene and lubricating oils.

ROMANO-AMERICANA. *Teleajen Refinery*

(a) One continuous battery of 12 shell stills; modern equipment with bubble towers.
(b) One Foster Wheeler pipe still; 7000 bbl.
(c) One tank and tube cracking plant.
(d) One tank and tube cracking plant under construction.
(e) Continuous lubricating distillation installation.
(f) Refining installation for kerosene and lubricating oils.
(g) One asphalt plant.
(h) One Heckmann rectifying plant of six stills.

ORION (UNIREA). *Ploesti Refinery*

(a) One old continuous battery of seven shell stills with no bubble towers; 4900-5600 bbl.
(b) One McKee pipe still with single pass; 7000 bbl.
(c) One lubricating plant of 10 stills.
(d) One Heckmann rectifying plant of three stills.
(e) Refining installation for kerosene and lubricating oils.
(f) One gasoline plant with four apparatus for wet gas; dry gas supplying the town of Ploesti (only installation).

SPERANTA (UNIREA). *Ploesti Refinery*

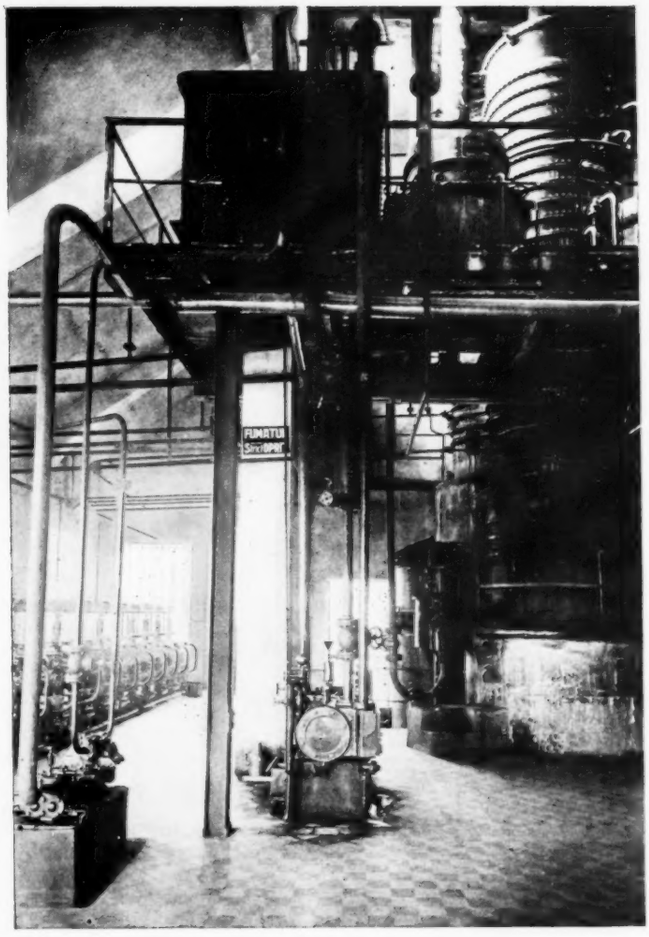
(a) One old continuous battery of six shell stills; 2800-3500 bbl.
(b) One McKee pipe still with single pass; 4200-4900 bbl.
(c) One benzine rectifying plant.
(d) Refining installation for kerosene.

AQUILA (COLOMBIA). *Ploesti Refinery*

(a) One continuous battery of six shell stills with bubble towers; 4200-5250 bbl.
(b) One Foster Wheeler pipe still; 5600 bbl.
(c) One Dubbs cracking unit with flashing.
(d) One Dubbs in construction (from Cerna-Voda refinery).
(e) Refining installation for kerosene.

Colombia;

Refinery at Cerna-Voda stopped; very old installation.



Column rectifying still at Concordia "Vega" refinery, Ploesti.

Part of the refinery of Concordia "Vega" at Ploesti, Roumania, showing railroad loading racks.

XENIA (*Romano-Africana*). *Ploesti Refinery*

(a) Two discontinued shell stills, without bubble towers; 840 bbl.
(b) One Bormann pipe still; 3500 bbl.
(c) One refining installation for kerosene.

DACIA. *Ploesti Refinery*

(a) One battery of four shell stills.
(b) One Stratford plant, with three stills under construction; 3500 bbl.

CARMEN-PETROL. *Targoviste Refinery*

(a) One small battery of shell stills.
(b) One Stork & Co. pipe still.

VENUS (ROMANO-BELGIANA). *Ramnicul-Sarat Refinery*

(a) Bormann pipe still—for paraffin crude oil.

The other refineries all have shell still installations, with or without bubble towers and lubricating plants.

The activity of Roumanian refineries during 1930 is also shown in a table accompanying this article. The proportion of the various products obtained in 1929-1930, was as follows:

Products from Roumanian Refineries

Product	1929 (Barrels)	1930 (Barrels)
Light benzine	4,420,127	5,795,215
Heavy benzine	2,287,698	3,057,518
White spirit	531,174	649,941
Kerosene	7,070,394	8,266,941
Gas oil	3,968,917	4,979,056
Mineral oils	787,192	794,782
Paraffin	48,797	53,046
Asphalt	....	166,740
Coke and residue	....	177,555
Fuel oil	13,153,735	13,538,042
Total	32,268,034	37,478,836
Fuel	2,261,280	2,563,974
Total	34,529,314	40,042,810
Losses	703,728	1,660,712
Grand total crude oil treated	35,233,042	41,703,522

All figures converted from metric tons. Ratio used —light and heavy benzine, 1 ton=8.5 bbl.; white spirit, 8.4 bbl.; kerosene, 7.75 bbl.; gas oil, 7.6 bbl.; mineral oils 7.5 bbl.; paraffin, asphalt, coke, and residue, 7 bbl.; losses 8 bbl.

The main problem confronting the Roumanian refining industry undoubtedly is the necessity of keeping pace with modern improvements. The following is an enumeration of a few of its present technical shortcomings.

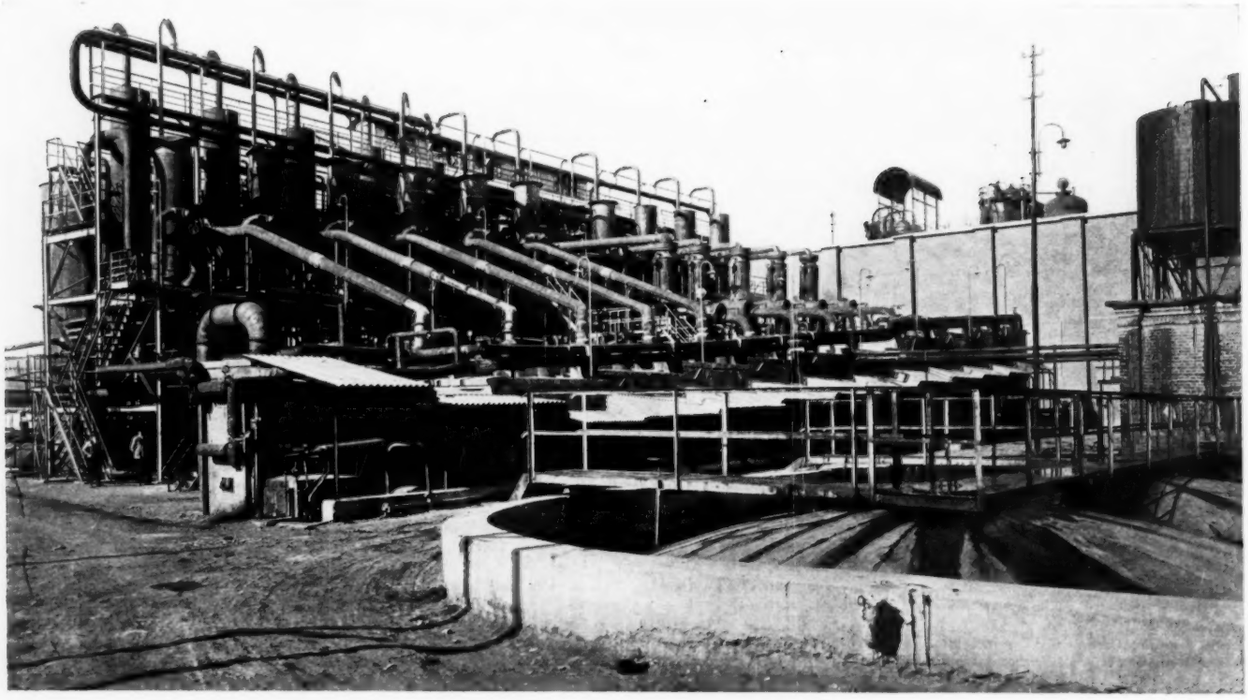
When studying the equipment of Roumanian refineries, one is struck by the lack of cracking plants. The proportion of fuel oil to total production of Roumania is about 50 percent. Only one-quarter of that quantity can be cracked with existing installations.

Except for a few small plants there

Handling and Storage Facilities of Roumanian Refineries

(Converted from metric tons. Ratios used given head of columns.)

REFINERY	YEARLY CAPACITY						STORAGE CAPACITY AT REFINERIES					
	Distillation 7.	Refining 7.	Rectification 7.	Lubricating oils 7.	Paraff. plant 7.	Cracking plant 7.	Crude oil 7.	Mazout 8.5	Gas-oil 7.5	Lubricating oils 7.	Kerosene 7.75	Gasoline 8.5
Steaua-Romana Campina	9,800,000	1,750,000	1,260,000	630,000	49,000	1,680,000	155,022	220,405	113,010	102,221	380,849	226,958
Steaua-Romana Moinesti	420,000	84,000	.....	.....	....	.....	38,990	13,345	2,025	....	5,890	3,995
Astra-Romana	8,925,000	2,555,000	2,296,000	7,700,000	....	2,550,000	483,455	1,249,712	154,275	205,569	335,382	362,933
Concordia "Vega"	6,552,000	1,190,000	1,176,000	280,000	....	.....	363,384	69,471	51,750	11,571	93,017	126,948
Romano-Americana	4,095,000	1,470,000	700,000	1,050,000	....	700,000	423,500	242,250	26,250	47,600	131,750	297,500
Unirea and Orion	5,250,000	1,575,000	840,000	210,000	....	.....	193,767	158,669	30,382	17,367	77,228	341,827
Credit Minier "Aurora"	2,044,000	511,000	511,000	.....	....	.....	95,900	119,850	10,125	350	56,110	55,420
Credit Minier "Tileagd"	336,000	175,000	42,000	126,000	....	.....	22,869	21,395	4,140	18,494	25,279	16,745
Credit Minier "Orsova"	336,000	58,800	42,000	126,000	....	.....	30,520	30,005	2,925	33,124	17,205	13,056
Petrol-Block "Standard"	2,940,000	1,085,000	651,000	210,000	....	.....	119,560	119,000	64,500	1,400	55,025	167,748
Petrol-Block "Baneasa"	350,000	126,000	49,000	70,000	....	.....	18,200	12,750	2,925	2,555	9,300	8,500
Petrol-Block "Satura"	1,260,000	252,000	168,000	.....	....	.....	42,000	25,500	15,000	....	15,500	20,400
Colombia	2,100,000	840,000	420,000	.....	....	420,000	87,500	217,600	34,875	....	37,200	99,450
Romano-Africana "Xenia"	1,764,000	490,000	.....	.....	....	.....	104,965	89,488	16,470	....	87,272	82,849
Petrolul Bucuresti	1,750,000	630,000	630,000	.....	....	.....	54,600	42,735	9,525	....	25,730	47,090
Redeventa	1,260,000	490,000	210,000	.....	....	.....	21,000	42,500	30,000	9,135	54,250	25,500
Petrolmina "Lumina"	1,190,000	406,000	.....	.....	....	.....	37,800	61,285	9,000	....	23,987	49,810
Carmen-Petrol	1,120,000	280,000	224,000	.....	....	.....	56,000	25,500	7,500	....	15,500	16,660
Cometa	882,000	350,000	176,400	.....	....	.....	25,200	22,100	7,500	....	25,964	24,650
Dacia Romana Petr.-Synd.	756,000	196,000	168,000	.....	....	.....	21,000	24,650	3,750	....	19,375	31,025
Fratia	504,000	201,600	182,000	.....	....	.....	63,000	21,250	3,750	....	9,300	14,450
Intrep. I. Grigorescu	490,000	151,200	126,000	.....	....	.....	14,000	21,250	5,250	....	31,000	32,300
Petrol Latina	511,000	127,400	127,400	.....	....	.....	21,000	16,150	3,375	....	93,000	102,000
Romano-Belgiana "Venus"	453,600	104,160	.....	58,800	....	.....	21,000	7,735	4,620	28,455	5,618	13,617
Photogen	420,000	196,000	140,000	42,000	....	.....	17,920	11,602	7,043	16,891	9,145	16,176
Luciana	420,000	84,000	52,500	.....	....	.....	12,250	14,110	1,275	....	5,308	18,190
Noris	378,000	126,000	88,200	.....	....	.....	28,000	13,600	2,250	....	7,206	12,155
Titan Petrol	280,000	105,000	.....	.....	....	.....	22,750	5,100	525	....	4,264	5,908
Pallas	252,000	98,000	126,000	.....	....	.....	7,098	4,964	2,505	....	12,121	5,559
Ind. de Petrol Fridman-Dej	252,000	70,000	59,500	49,000	....	.....	10,045	14,025	2,625	3,640	8,990	9,350
Coronana	224,000	70,000	.....	.....	....	.....	10,500	8,500	1,875	70	4,106	4,250
Moldonaphta (Danube Oil)	210,000	140,000	.....	.....	....	.....	8,050	7,140	1,050	....	6,758	5,695
Raf. de Petrol Targu-Mures	161,000	77,000	49,000	70,000	....	.....	17,500	.....	6,000	35,000	6,200	4,250
Petrolul Bucovinean	140,000	42,000	28,000	.....	....	.....	5,950	2,975	1,350	420	2,325	2,550
Intrepr. Fr. Niculescu-Ciufu	126,000	126,000	35,000	.....	....	.....	5,145	4,233	637	....	3,355	4,896
Heinrich Steinberg	119,000	45,360	.....	.....	....	.....	3,689	1,768	1,095	....	1,264	2,643
Helios	105,000	48,500	20,230	.....	....	.....	7,000	10,200	2,250	....	3,875	3,740
Uranus	84,000	28,000	.....	.....	....	.....	2,058	1,301	278	....	596	1,148
H. Bernstein	63,000	7,000	.....	.....	700	.....	1,750	2,380	3,750	....	1,395	595
H. Blum FII and C. Fainaru	63,000	21,000	35,000	.....	1,400	.....	2,800	510	1,950	....	310	637
Dr. Smarack	52,500	28,000	.....	.....	....	.....	4,900	2,550	1,125	....	1,550	1,275
I. Bermann	52,500	42,000	.....	.....	....	.....	3,500	850	375	....	2,132	1,275
Bitum-Matitza	51,100	10,080	.....	.....	....	.....	630	297	75	....	93	85
Leon A. Leibu	38,220	8,400	.....	.....	35	.....	1,190	850	675	....	179	238
Fratii Freund	35,000	14,000	.....	.....	....	.....	2,100	1,020	1,275	....	1,667	1,148
Victoria (Petrolifera)	28,000	14,000	.....	.....	....	.....	2,100	850	1,125	....	1,550	850
B. Scheffler	17,500	5,600	.....	.....	280	.....	1,036	2,720	1,095	259	341	127
Petrolul Buzau	56,000	21,000	.....	.....	846	.....	2,100	850	1,050	2,100	1,161	425
Alter Schwarz	12,600	10,500	.....	.....	210	.....	644	876	1,020	....	155	170
Alik Leibu	8,400	2,800	.....	.....	140	.....	700	850	1,125	....	231	213
N. V. Ciocardel	28,000	.....	.....	.....	....	.....	49	170	....	....	155	42
Nathan Silberman	7,000	5,880	.....	.....	105	.....	1,260	1,275	1,500	....	620	425
M. Haimsohn	2,100	665	.....	.....	140	.....	805	2,125	2,250	....	954	510
C. Haimsohn-Buhusi	2,100	.....	.....	.....	350	.....	1,470	238	1,500	....	449	485
TOTAL	58,776,620	17,159,285	10,632,230	10,621,800	53,200	5,355,000	2,699,221	2,992,544	663,570	536,221	1,719,186	2,286,441



Allan units at Campina refinery of Steau Romana.

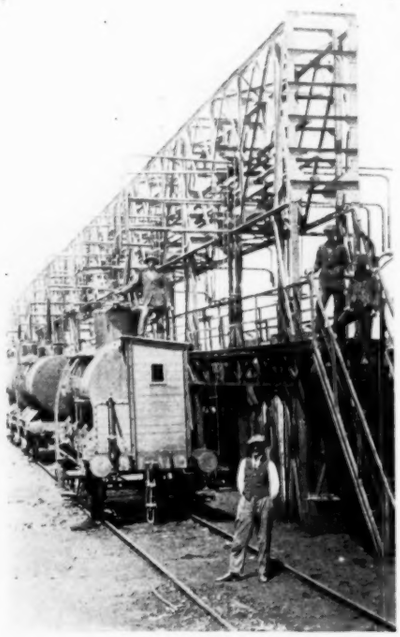
exists only one paraffin plant in Roumania. The fact that three-quarters of the production of crude in Roumania is paraffinous, indicates how inadequate is this single installation with a yearly capacity of 7000 tons

It is interesting to note that the quantity of fuel-oil used as fuel in Roumanian refineries during 1930 was 2,563,974 bbl., which represents approximately 6.5 percent of the total quantity of crude handled. Losses represent another 3.68 percent. There is little doubt that these excessive figures could be considerably reduced by improvements to existing plants. For economy of fuel a general adoption of the pipe still system would be advisable, and losses could be diminished by improvements in the storing system.

Extraction of paraffin out of the paraffinous distilled products would make it possible for refineries to produce good lubricating oils. At present lubes are only obtained from non-paraffinous fuel-oil, which is becoming rather scarce as the proportion of non-paraffinous crude to total production of crude in Roumania is becoming less every day.

Modernisation of installations for power generation, and pumping of liquids has been neglected, even by some of the biggest refineries. Improvements in this direction would realise important economies in the cost of handling crude and products.

Storage capacity for both crude and products at refineries is insufficient. Existing capacity represents in all less than two month's output. For normal production and normal times, when production can be disposed of without difficulty, the capacity is perhaps ample. In the case of a crisis, however, when marketing of products is difficult, a limited storage capacity is a great impediment to the refining industry. The worse the market, the keener are sellers to sell, so as to clear their tanks for the continuous inflow of crude. A company has either to sell at any price, or create a congestion on the oil fields, or stop producing altogether. [This has resulted in Roumania selling products below Gulf and Russian prices—EDITOR.]



Loading rack of the Colombia Sc. Franco Roumania de Petrole.

Pipe-lines, both from the oilfields to the refineries, and from the latter to the export stations of Constanta and Giurgiu, are inadequate for Roumania's present production. The same applies to the pumping installations and the wharfage at Constanta.

It was hoped that a step forward would be made by laying a gasoline pipeline from Baicoi to Constanta. Although the Cabinet approved the proposal of an Austro-American (National Supply Corporation) group for laying this line, as reported in WORLD PETROLEUM recently, the bill had to be withdrawn from the Chamber of Deputies on account of bitter opposition.

A corrolary to an inadequate pipeline system is the excessive cost of transporting crude to refineries, and transporting refined products by rail and existing pipe-lines. Keener competition between carriers would be a great help

to the petroleum industry in Roumania.

Extraction of natural gasoline from gas is done only on a limited scale. Natural gasoline obtained in 1930 totalled 756,162 bbl., representing about seven percent of the total amount of gasoline produced last year. This is only a fraction of the quantity that could be obtained if the oil companies all had adequate installations for treating gases produced by their wells. The gases are mostly lost, or burnt in flares that can be seen all over the Roumanian oil fields, instead of being used for lighting and heating the town of Bucarest, for instance, which is not more than 100 km. from the main oilfields. What Roumanian refineries also lack are installations for the blending of natural gasoline.

Having given a short survey of the technical problems with which the Roumanian refining industry is confronted, it is necessary to add a few words on another problem. It is one of equal importance to refiners, and does not depend on improvement of installations, but on improvement in organisation.

At present Roumania's home consumption of oil products is ridiculously small. It consumed last year the following quantities:

Petroleum Consumption in Roumania 1930

Product	(Barrels)
Light benzine	634,227
Heavy benzine	139,842
Kerosene	1,309,719
Gas oil	692,580
Mineral oils	237,922
Paraffin	36,001
Fuel oil	*6,057,380
Total	9,107,671

* 2,187,920 bbl. were used by the State railways. All figures converted from metric tons. Ratio used—light and heavy benzine, 1 ton=8.5 bbl.; white spirit, 8.4 bbl.; kerosene, 7.75 bbl.; gas oil, 7.6 bbl.; mineral oils, 7.5 bbl.; paraffin, asphalt, coke and residue, 7 bbl.; losses 8 bbl.

These figures represent only 24.42 percent of the oil products produced in 1930. Considering that the population of Roumania is 18,000,000, the per capita figure for light products is 5 kg., and 8 kg. for kerosene. These figures are comparatively small. The President of the Association of Petroleum Industrialists recently declared he felt convinced that the per capita consumption of kerosene could easily be increased by at least 100 percent.

The surest step to improving the position of the oil industry in general, and of the refining industry in particular, is not only in the re-establishment of the cartel, but in an effort to increase internal consumption of oil products. At present this is somewhat difficult due to the general crisis, and to the considerable drop in the purchasing power of the Roumanian people, mostly agriculturalists.

As an illustration it can be stated that although prices of products have dropped 50 percent since October last, consumption has not increased appreciably. In case, however, general business conditions improve there is room for a tremendous increase in Roumanian domestic consumption, stimulated by a better sales organisation and methods, better roads, etc. This is all the more important as, taking a pessimistic view of the future, the possible eventual success of the Russian Five Year Plan and the forthcoming opening of the Iraq oil fields, the Roumanian petroleum industry may have to depend on domestic consumption.

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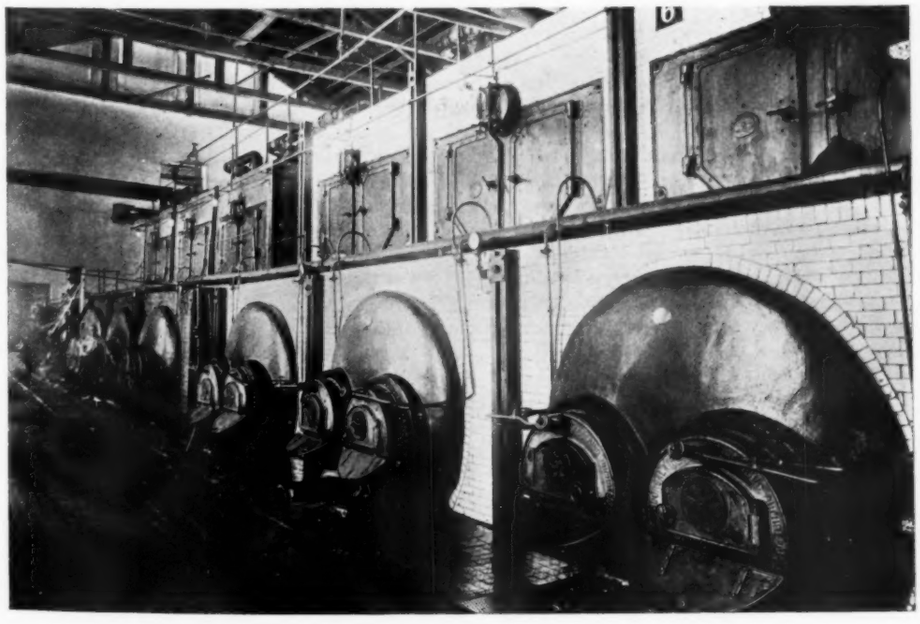
Neat boiler installation at the Concordia "Vega" refinery, Pleosti.



In addition to the refined liquid products mentioned above, the following table gives figures for solids produced in 1930. Figures represent metric tons.

	Paraffin Wax	Coke and Asphalt Residue	
Astra-Romana	..	5,043	8,520
Steaua-Romana	7,163	10,792	15,101
Unirea and Orion	..	2,840	..
Concordia "Vega"	..	1,420	..
Romano-Americana	..	7,970	816
Credit Minier "Aurora"	..	374	249
Credit Minier "Aurora"	..	656	281
Petrol-Block Standard	..	82	..
Colombia	..	..	85
Romano-Belg "Venus"	348	..	..
Photogen	..	768	314
H. Blum	16	..	..
M. Haimsohn	7	..	..
Leon A. Leibu	4	..	..
C. Haimsohn	15	..	..
Rad de Petrol din	..	90	..
H. I. Bernstein	13	..	..
Petrolul Buzau	12	..	..
Total	7,578	23,820	25,365

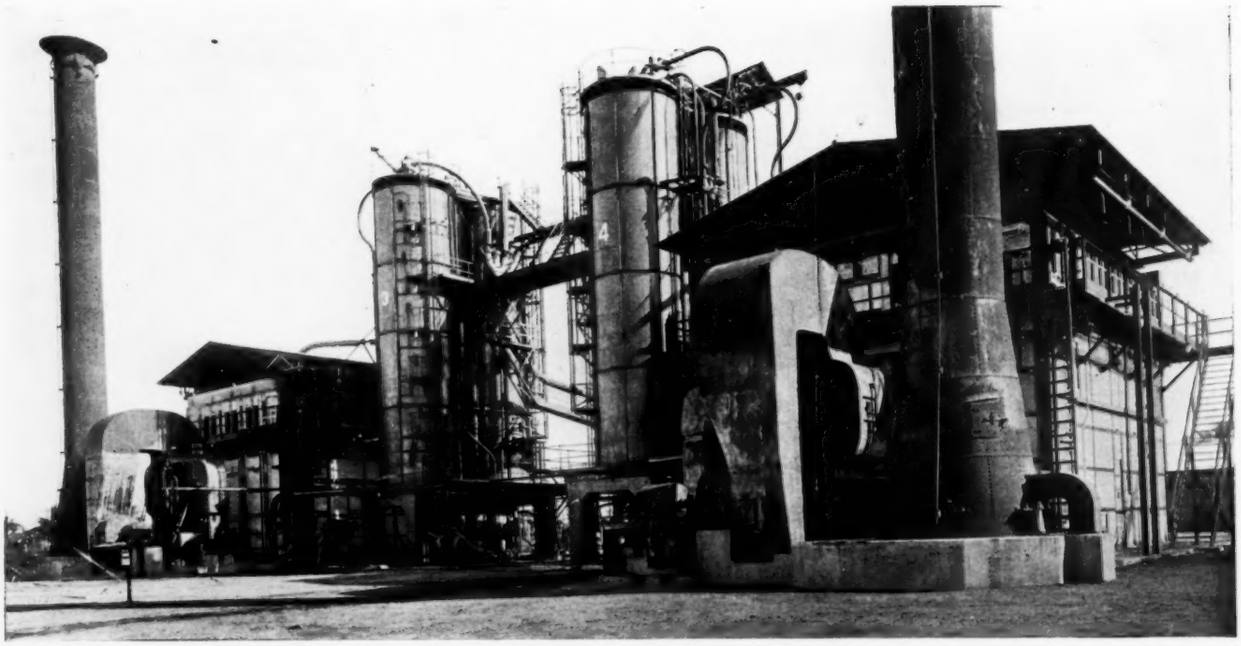
▲

New Agentine Refinery

THE new petroleum refining plant of the Diadema Argentina S. A. Petroleo, an affiliate of the Shell Mexicana Argentina Ltd., was inaugurated on May 9, 1931, in the presence of a distinguished company, including several cabinet ministers of the Provisional Argentine Federal government, the Ambassador from Holland, and a numerous group of prominent industrialists. Lieut. Col. Alvora Alzogaray, personal representative of the President of the Republic, used the key which set the machinery in motion.

This new refinery is located on the South Dock of the port of Buenos Aires. Its supply of crude oil is obtained from the Colonia Escalente oil field, where there are a number of producing wells and a large extent of proven oil territory. The Colonia Escalente field is situated 27 kilometers in the hinterland from the port of Comodoro Rividavia on the gulf of San Jorge. The oil is brought down to storage tanks at the port by means of a pipe line 25 kilometers long. From these tanks it is transported to the refinery at Buenos Aires by two 7500-ton tank steamers exclusivly contracted for this service and flying the Argentine flag.

The refinery at present has a capacity for working 7,000 bbl. of crude oil per day. It is a typical pressure cracking plant with four Dubbs units, convection furnaces; each unit contains a Smith reaction chamber and a Smith fractionating tower. All four of these cracking units are of the non-residual type, and the only products obtained are gasoline, non-condensible gas, and coke.



Cracking units of modern design at the Trinidad Leaseholds refinery, Pointe-a-Pierre, Trinidad.

American Design in World Refining

There Are About 300 Refineries in Countries Outside the U. S. A. and Most Have Equipment of American Design Including Those Producing Lubricating Oils.

By John Primrose

tmospheric distillation unit at lmas Fuzito, Hungary.

EVER since the Drake well was dug in Pennsylvania in 1859, the United States has led the world in crude oil production. Likewise, the rapid growth of automobile traffic and the tremendous rise of industrial machinery, has kept consumption of petroleum products in the United States far above the rest of the world combined. It is only natural, therefore, that the big strides made in the processing of petroleum products should originate in the United States.

The best method of handling construction work abroad, is through subsidiary organizations maintained by American manufacturers. This applies particularly to oil refinery installations, because of the technical nature of the work and the new features of design frequently involved. Efforts to carry out contracts overseas from an American base have quickly and definitely demonstrated the necessity of capable and experienced foreign organizations close to the site, and in touch with all angles of the situation and all sources of supply. American manufacturers successful in foreign refinery construction have had to specialize in the development of suitable organizations abroad, including branch offices, shops for fabricating special apparatus and working arrangements of an advantageous nature with local firms able to produce standard equipment. With such an international organization it is possible for an American manufacturer to construct a refinery abroad without loss of time, at minimum cost, in strict accordance with the standards prevailing—and yet include the latest improvements.

American refinery practice is steadily advancing, and the oil industry of other countries will continue to benefit.

The first modern tube still, built for high capacity and high efficiency by separating radiant heat and convection heat absorption surfaces, was installed in the United States in 1920. The great success of tube stills of this kind led to the adoption of the bubble tower, which permits single flash continuous distillation of the products vaporized in the tube still. Although several bubble towers were previously installed for the separation of a few fractions, the first complete unit of bubble tower and tube still for reducing crude into all of its major commercial fractions in a single operation was put into service in the Mid-Continent field in 1926.

In the last five years, great strides have been made in a simplification and general improvement of the single flash distillation unit. Among the most important steps was the development of the two-stage atmospheric vacuum distillation unit first put into service in 1928. Units of this type are used primarily for the continuous manufacture of high-grade lubricating stocks.

There are now in operation, or in process of construction, continuous dis-

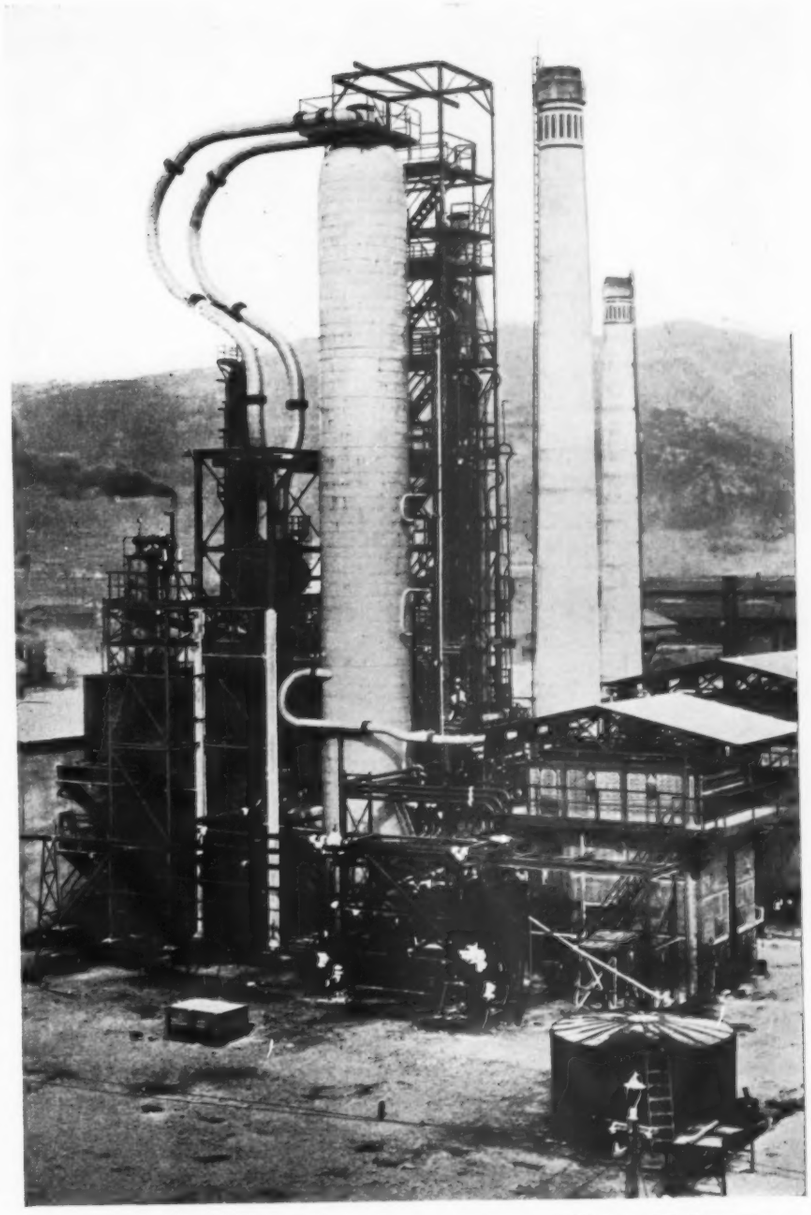
tillation units for every continent. Almost every field of oil production is equipped with refinery units built from American plans. In addition, there are a large number of units distilling crude transported in bulk from point of production to distributing center.

In Australia, there is a large quantity of oil shale, but no crude is produced on a commercial scale. There are some indications, however, that both Australia and New Zealand may become commercial producers in the near future. A single stage unit is now under construction for the distillation of crude to be imported by tanker. Most of the crude handled in Australia is imported from British Borneo, United States, Burmah, and Persia.

Deposits of petroleum in both Burmah and Persia were well known in ancient times. However, it was not until modern drilling methods were developed that these fields became large producers. In Burmah a two-stage distillation unit for the manufacture of high grade lubricating stocks, as well as straight run gasolines and naphthas, has recently been put into service, handling 8,500 bbl. per day. In Persia, and adjacent Iraq, numerous modern units for distillation and cracking have been installed within the last three years.

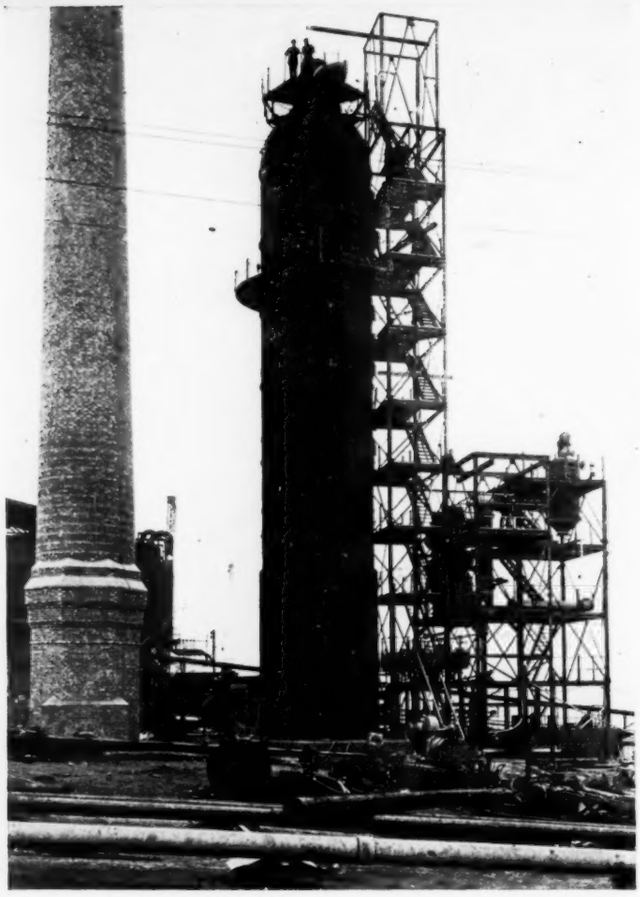
The forerunner of the modern distillation units in Asia and Europe, was the installation of a modern tube still at Abadan, Persia, which went into service in 1927. This was the first of seven tube stills installed in rapid succession. These stills were so successful in reducing refinery costs that, less than two years after the first went into service, a single flash distillation unit of tube still and bubble tower was ordered. The Abadan refinery is now one of the most modern in the world, having, in addition to the original tube still topping units, several high-efficiency cracking units, five large single-stage distillation units, and three modern rerun units. Four of the atmospheric distillation units at Abadan each have a capacity of 12,500 bbl. of crude per dy. The three rerun units have capacities of 7,000 bbl. of pressure distillate per day. Illustrations were published in WORLD PETROLEUM for January, 1931.

Climatic conditions in the Mesopotamian Valley make refrigeration, and, therefore, the manufacture of lubricating oils, an expensive process. A large portion of the production from that field is shipped to the British Isles where lubricating stocks are fractionated from reduced crudes received in bulk. Inasmuch as most of the fractionation of the crude is accomplished in the oil fields by the distillation units mentioned above, leaving only the distillation of lubricating oil to be accomplished in Great Britain, most of the distillation units located in Great Britain are comparatively small. Two of the largest vacuum reduced crude and rerun units erected for Anglo-Persian Oil Company are in the Llandarcy, Wales refinery, and have capacities of 2,000 and 1,500 bbl., respectively.



Two-stage distillation unit at Aadamat su refinery of Nippon Oil Company, handling 2500 bbl. Californian crude, which it reduces to eight different fractions including three lube stocks.

Continental Europe has several good sized oil fields; most of the larger countries are equipped with refineries which have been, or are now being, fitted with modern equipment of American design. The largest fields, also the largest refineries, are in Russia in the Balachny and Grosny districts. A large quantity of oil is refined in Russia and much crude is exported. One of the most important features of the Soviet five-year program is the modernization of its refineries in these fields to exploit this oil. There have now been placed in operation three single-stage units of 10,000 bbl. each for fractionating Balachny crude to fuel oil bottoms, and a two-stage unit of 10,000 bbl. capacity for running the same kind of crude to high grade lubri-



Vacuum distillation unit at Llandarcy refinery, Wales, of the Anglo-Persian Oil Company. It charges 2000 bbl. of reduced Persian crude daily, recovering lubricating stocks.

cating stocks. In the Grosny field, there is in operation a single-stage atmospheric unit handling 15,000 bbl., which is reduced to cracking stock and fuel oil bottoms. There is also in service in this field a two-stage unit that recovers heavy lubricating stocks from 4,400 bbl. per day.

The two-stage Balachny crude unit, just mentioned, is of exceptional interest to refinery engineers because it is the only one of its kind in operation. This unit consists of three towers and three tube stils; one tower and still operate at atmospheric pressures, the tower removing the lighter fractions from the crude. To get the greatest flexibility possible from a unit of this size and to meet manufacturing demands for stocks of various specifications, the processing of the reduced crude is done in two different units. On either side of the atmospheric section are the two vacuum tube stills and towers which operate independent of, but parallel to, each other, producing a maximum number of lubricating stocks to exact specifications.

Overseas associates of the Vacuum Oil Company have already placed in operation four atmospheric distillation units for the continuous single-flash fractionation of high grade lubricating stocks direct from crude. Several other distillation units are under construction and will go into operation in the near future. The Vacuum Oil Company, A.Sp., of Czechoslovakia, is operating a 1,200 bbl. unit at Kolin. The Deutsche Vacuum Oel, A.G., of Germany, is processing 1,000 bbl. per day in an atmospheric unit in Bremen. The Vacuum Oil Company, R.T., of Hungary, processes 1,500 bbl. of crude in an atmospheric single-flash unit.

The Vacuum Oil Company, S.A., of Poland, has an atmospheric crude unit and an atmospheric rerun unit in service at Dziedzice. The crude unit has a capacity of 1,500 bbl. per day; recovering gasoline, naphtha, kerosene, gas oil, three or four lube oils and flux bottoms in one operation from crude. The rerun unit at Dziedzice handles the entire rerun operations of the plant, having a capacity of 500 bbl. per day. When pressed wax distillate is charged, three lubricating oil streams and bottoms are recovered.

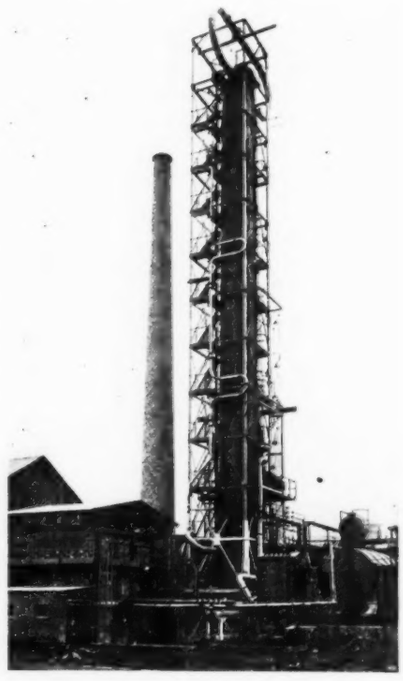
Recent changes in French legislation have permitted the building of large modern refineries; one is under construction for the Government, and others for the Vacuum Oil Company. One of the refineries for the Vacuum Oil Company is being built at Port Jerome and will include two-stage crude units and two atmospheric rerun units. One of the two-stage units is designed to handle 2,000 bbl. of crude per day, and the other is designed to handle 4,000 bbl. of crude per day. Both of these units will recover, continuously, high grade lubricating stocks, which, after being de-waxed, will be processed in the atmospheric rerun unit. One of the rerun units will handle 1,200 bbl. of pressed distillate per day, and the other, 850 bbl. of cylinder stock solution per day.

Roumania has been exploiting its oil for several years, shipping bulk crude to many European countries. Some of this crude is now being procesed in the oil fields, both distillation and cracking units having been installed. The largest distillation unit is at Bucharest and handles 5,000 bbl. per day in an atmospheric single flash cycle.

An interesting refinery, which has been modernized recently, is that of the Benit Societa Anonima Benzina Italiana at Naples. Among the new equipment installed in this refinery at the foot of Mt. Vesuvius is a single-stage atmospheric rerun for the processing of 1,000 bbl. of pressure distillate per day.

One South American field—the Argentine—produces mainly for domestic consumption. Argentine refineries were among the first refineries outside of the United States to adopt American methods, vapor separating towers for continuous skimming being installed at

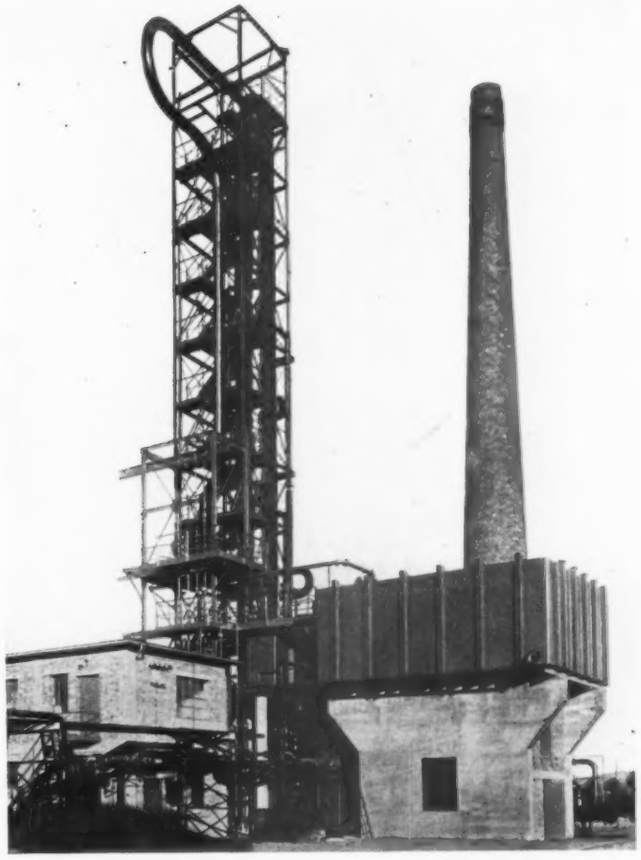
Deutsche Vacuum Oel A. G. refinery at Bremen, Germany.



the Buenos Aires refinery of Compania Ferrocarrilera de Petroleo in 1926. Three tube still units, complete with towers and heat exchangers for topping a total of 4,500 bbl. per day of Argentine crude, were installed at that time, and since have been supplemented by a fourth unit of the same size and kind. The other Argentine refinery of importance is that of the Government at La Plata. A modern tube still operates in conjunction with a battery of shell stills, preheating 16,500 bbl. per day 100 deg. to permit a topping cut being made before the preheated oil is pumped into the shell stills.

Most of the oil produced in Venezuela and Colombia is exported to the United States, Canada and Europe. A combination of economic and legal factors results in the majority of oil being shipped out of the country of production in crude state. A large portion of the oil is then processed at some intermediate point before it is delivered to the countries where it is consumed. Thus, there are several important refineries in the Netherlands West Indies, which process South American crude received by tanker, and deliver finished gasoline to distant consumers.

One of the cracking plants in the Netherlands West Indies is among the largest in the world. In this plant there are eight large tubular heaters for cracking units, each with a capacity of 3,000 bbl. of fresh charge per day. Another refinery in the Caribbean has one of the largest topping still batteries in the world. There are seven modern tube stills used for removing the lighter fractions from South American crude. Each of these stills has a capacity of 14,000 bbl. per day.



Kolin, Czechoslovakia, refinery of the Vacuum Oil Company, A. Sp. It produces continuous streams of eight different fractions.

Burma Oil Company's 8500 bbl. per day two-stage distillation unit near Rangoon, running crude to lube stocks in a single operation.

The Island of Trinidad, long famous for its asphalt lake, is an important source of crude and has its own distillation and cracking units. The first single-flash distillation unit installed at Trinidad was placed in service in 1928. This unit is used for topping 7,000 bbl. per day, recovering gasoline, kerosene, gas oil and fuel oil. The second unit installed a year later has a capacity of 15,000 bbl. per day. Gas oil recovered from the two topping units is used as charging stock for tubular heaters of modern cracking units built to operate at high efficiency.

A modern development that has improved the efficiency of cracking still heaters, is the air heater, which is installed with most modern cracking units. Air heaters recover a large amount of heat from the flue gases raising the temperature of air for combustion. The use of air heaters is possible only because the modern tubular heater has sufficient radiant heat absorbing surface to prevent excess furnace temperatures when preheated air is used. The new cracking units installed in both the Netherlands West Indies and Trinidad are equipped with air heaters.

Another important oil field of South America is Peru, which exports to Canada about 10 percent of the oil used there. Exploration has discovered other South American possibilities which will probably be exploited when market conditions improve. One of the most promising of the new fields is Bolivia.

Mexico has the largest oil field in North America outside of the United States. A large part of the petroleum produced in Mexico is exported as crude, the balance being topped and residue cracked to produce a maximum yield of gasoline.

Small quantities of petroleum have been collected yearly in Japan for many centuries. This oil was obtained from natural wells or springs and was used for medicinal and lighting purposes. Petroleum has not been found, however, in sufficient quantity to meet the needs of modern industry in Japan and for that reason is being imported, principally from Sakhalin, Netherlands East Indies and the United States. One of the largest Japanese refineries is that of the Nippon Oil Company, at Kudamatsu-Cho, Yamaguchi, Ken. This refinery specializes in the manufacture of high-grade lubricating stocks from California crude, using for fractionation a two-stage atmospheric and vacuum distillation unit with a capacity of 2,500 bbl. of crude per day. One of several modern cracking units in Japan is also located in this refinery, charging the middle fractions received from the distillation unit.

Vacuum tube still under construction.

New Soviet Refineries for the Far East

First Tangible Step in Soviet Invasion of the Far Eastern Markets. Details of Foster Wheeler Units to Be Constructed for Refining Sakhalin Crude.

ACCORDING to information emanating from Russia, the two refineries to be built at Khabarovsk and Vladivostock by the Soviet Oil Trust, to which reference has previously been made, will be of Foster Wheeler design. Kerosene and other products manufactured at these two refineries will be used for expanding sales in the interior markets of the Far East and for other exports. Information has not yet been published as to whether these plants will be ordered to be constructed in the United States or if they will be built by Russian engineering plants. WORLD PETROLEUM is enabled to describe the Foster Wheeler units of the same design as will be installed at Khabarovsk and Vladivostock. In fact, similar refining plants are at present under construction in the Black Sea region in Russia.

A combined atmospheric-vacuum unit of 4,000 bbl. daily capacity will process an asphaltic base crude of 33 deg. A.P.I., yielding gasoline as an overhead stream and naphtha, kerosene, and light gas oil as liquid side streams on the atmospheric unit. The vacuum unit yields heavy gas oil as overhead stream, and spindle, machine, and motor oils as liquid side streams. Bottoms are asphalt.

Crude is taken from storage to a vapor heat exchanger on the overhead from the atmospheric tower, and is passed on to a settling tank. From there, the crude oil is forced through a vapor heat exchanger on the overhead stream from the vacuum tower, through two liquid heat exchangers on the bottoms from the vacuum tower, thence to the inlet of the atmospheric tube still. Oil enters the bottom of the convention bank of the tube still, flows upward to the flue gases of the furnace and to the radiant roof section of the still which consists of two rows of bare tubes exposed to radiant heat from the fuel combustion. In the tube still, all is heated to about 600 deg. F., under which temperature the crude vaporizes sufficiently to make the desired products. From the tube still oil enters the bottom of the fractionating tower, which also acts as a flash chamber. Heavier unvaporized portions of the crude drop to the bottom of the tower passing a series of bubble trays where the light ends are stripped out by an ascending stream of steam led in through a coil located at the bottom of the tower.

Vaporized portion of the crude passes upward through a series of bubble trays that hold a quantity of liquid through which vapors pass. Heavier fractions of the vapors are condensed by the descending liquid reflux. At predetermined points of the tower portions of the descending liquid are taken into internal stripping sections, where they are stripped of light ends by steam.

The descending liquid stream of each stripping section is automatically controlled by a specially designed Weir control valve. Light portions of crude reach the top of the tower, where they are taken overhead as a gasoline vapor together with the steam of the tower. Temperature at the top of the tower is maintained by pumping back to the top tray a portion of the condensed overhead gasoline vapors. This operation is controlled by instruments provided for the purpose.

Overhead gasoline and steam vapor passes through one large line to the vapor heat exchanger and water-cooled cooler. Here gasoline and steam vapors

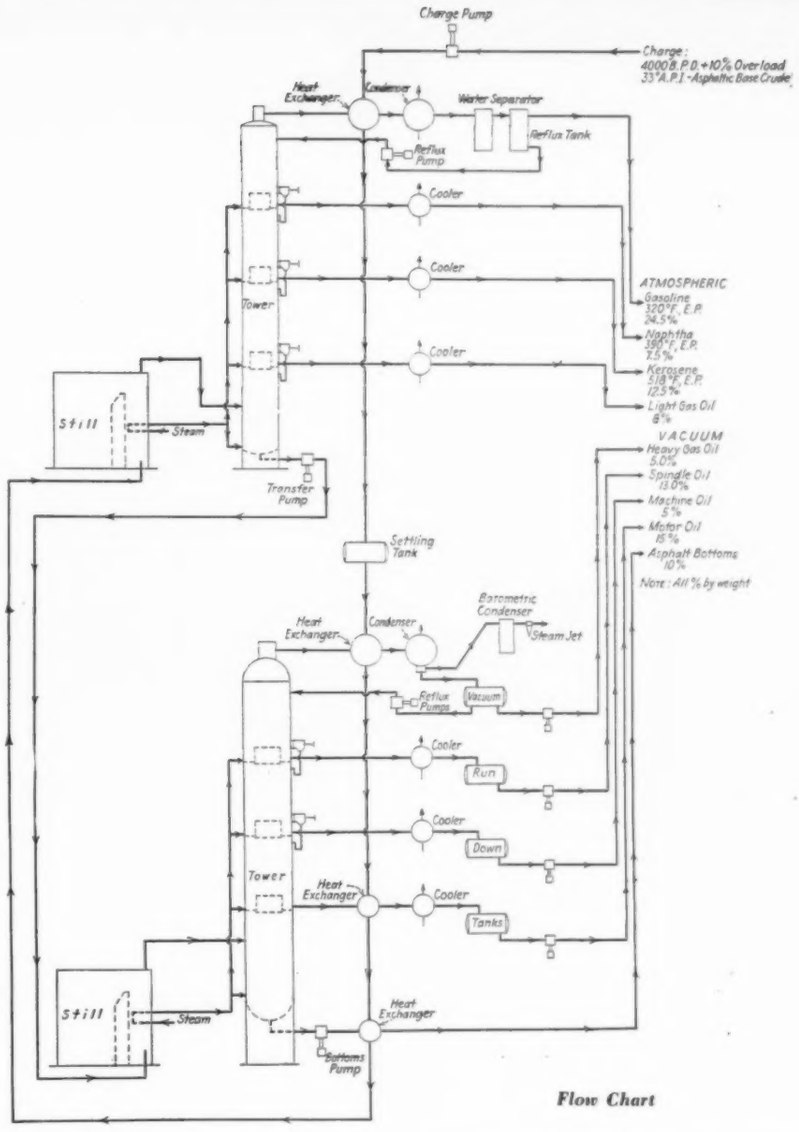
are condensed, cooled and passed into water separator tanks. Reflux for control of temperature at the top of the tower is pumped from the bottom of the reflux tank and the excess flows by gravity through sight glasses in the receiving house to storage. Three liquid side streams pass through water-cooled coolers and sight glasses to storage. Bottoms are pumped to the vacuum still of the unit.

The vacuum tube still is essentially the same as the atmospheric tube still, except that in the roof tubes of this unit provision has been made for increased expansion of oil vapors. This permits addition of the greater part of the necessary latent heat in the tube still.

From the tube still the heated oil is flashed into the bottom of the vacuum fractionating tower. This tower is designed to take heavy gas oil as an overhead stream and spindle, machine, and motor oil as liquid side streams. Overhead gas oil passes through vapor heat exchangers and coolers to the vacuum rundown tank. Spindle and machine oil side streams pass through water cooled coolers to their respective rundown tanks, but the motor oil side stream passes through a liquid heat exchanger and a cooler to the vacuum rundown tank. Heavy asphalt bottoms from the tower are pumped through liquid heat exchangers to storage. The principle difference between the vacuum tower and the atmospheric tower is that the former is larger, and is operated at a low absolute pressure instead of atmospheric pressure.

Low pressure is maintained by a vacuum system consisting of a barometric condenser and a series of steam jets. Temperature of the overhead gas oil and steam vapors are controlled at the outlet of the cooler so that the oil vapors are condensed and steam is maintained as a vapor. At the bottom of the cooler a hot well is provided from which steam vapor, entrained air, etc., are taken into the barometric condensers. Here the steam is condensed, and then passes out of the system with the cooling water. The remaining entrained air, etc., is withdrawn through the steam jets and ejected.

The overhead gas oil stream and three liquid side streams flow by gravity into horizontal rundown tanks, where a higher absolute pressure is maintained than at the tower. From the rundown tanks the streams are pumped through sight glasses to storage. Reflux necessary for controlling temperature at the top of the vacuum tower is pumped from gas oil vacuum rundown tanks.



Flow Chart

It might be mentioned that the single stage atmospheric unit under erection at Grozni has been designed to process daily 15,000 bbl. of paraffin base crude of specific gravity of 0.854 to yield gasoline, naphtha and kerosene as overhead and gasoil as side streams. Bottoms are fuel oil. The process is essentially the same as given in the foregoing description of the atmospheric stage of the combined unit, with the difference that here at the tube still oil is split into two streams entering the bottom of the convection bank and flowing upward in parallel streams counter current to the flow gases from the furnace. From the convection bank the two streams pass through the radiant or roof section of the tube still.

Three single-stage atmospheric units of similar design have been erected at Batoum on the Black Sea. Each unit is capable of refining 10,000 bbl. of asphaltic base crude per day, and yields gasoline as an overhead with naphtha, kerosene, and gas oil as side streams and fuel oil as bottoms. Tube still and tower on each of these units is practically the same as the atmospheric stage of the combined atmospheric-vacuum unit erected at Grozni, except that these are larger in size.

The two-stage unit, consisting of a single atmospheric tube still and tower and two vacuum tube stills and towers, were created at Batoum for the processing of asphaltic base Balchani crude of 33 deg. A.P.I. The atmospheric stage is designed to process gasoline as an overhead and naphtha, kerosene, and gas oil as liquid side streams. Vacuum units are designed to yield heavy gas oil as an overhead stream and solar, spindle, and machine oil, and overhead cylinder stock as liquid side streams. Bottoms from these units are asphalt. The atmospheric units are duplicates of the unit which was described before and the two vacuum units are identical in design and construction.

Modern Plant for Cracking Crude

How an American Engineering Company Is Designing a Refinery to Be Built by Germans Is Told by M. R. Walton of Arthur G. McKee and Company of Cleveland, Ohio.

MEMBERS of the oil fraternity, their customary enthusiasm for new developments somewhat dulled by the depression and its disturbing effect on their own industry, have given, until recently, only limited attention to the possibility of production and refining of petroleum within German territorial limits.

Petroleum authorities believe there is opportunity for the development of an integrated petroleum industry within Germany. One of them recently declared: "An optimistic future faces Germany in its effort to become a greater factor in the petroleum industry. I believe commercial products exist under the state of Oldenburg in the same manner, form and quantity as in the Hanover district."

The existence of petroleum in undetermined quantities in the northwestern section of Germany has been known for many years. But, it is only comparatively recently that proven territories are producing sufficient quantities of crude to give encouragement for further development of the known producing area. This has created a keen interest in the possibility of expanding along the lines of latest accepted practice, the refining of these oils to produce finished products for the German markets. Interest is stimulated by the importance that domestic production assumes in the face of a tariff of four dollars per bbl. on crude imported into Germany.

The Elwerath Gewerkschaft, through their various holdings in the present producing territories, are producing two crudes, which are designated as Nienhagen and Eddessa crude, in quantities sufficient to insure the operation of a refinery now under construction at Misburg, near Hanover, Germany. The yearly capacity of the equipment that is being installed is 721,000 bbl., processing these two crudes.

Careful commercial laboratory analyses and tests indicate that both these crudes are of excellent quality, although of different characteristics.

Nienhagen crude contains so little gasoline or naphtha that it may be charged directly to a Dubbs cracking unit, processing it for a maximum yield of specification gasoline or naphtha. Edessa crude contains a sufficient quantity of natural gasoline or naphtha, so that a topping or reducing operation is required for the production of gasoline or naphtha, kerosene, Diesel engine distillate or gas oil, leaving a reduced crude which can be charged directly to a cracking unit for a further production of gasoline or naphtha.

Properties of Nienhagen Crude

Gravity (Deg. A.P.I.)	26.6
Sulphur (percent)	0.5
B. S. and W. (percent)	1.2
Water percentg. (A.S.TM. method 300.12)	1.0

100 cc. A.S.T.M. Distillation

Percent	I.B.P. (deg. F.)
5	300
10	384
20	497
30	588
40	640
50	662
60	674
70	680
80	688
90	698
95	718

Percent Over 95 Deg. F.

Temperature	Percent
At 400 Deg. F.	10.0
At 410 Deg. F.	11.0
At 437 Deg. F.	13.0
At 572 Deg. F.	27.0
Percentage of coke by weight	4.6

Properties of Eddessa Crude

Gravity (Deg. A.P.I.)	34.5
Sulphur (percent)	0.3
Cold Test (Deg. F.)	15.0
B. S. and W. (percent)	0.4

100 cc. A.S.T.M. Distillation

Percent	I.B.P. (Deg. F.) 140
5	190
10	248
20	346
30	440
40	528
50	607
60	672
70	698
80	712
90	724
95	728

Percent over 97.0 Deg. F.

Temperature	Percent
410	27.0
437	29.5
572	45.0
Percentage of coke by weight	3.0

Reports in the latter part of 1930 indicate that there are 27 refineries in Germany manufacturing gasoline, naphtha and other light products, including lubricating oil and asphalt. Reported annual capacity of these refineries was upward of 4,250,000 bbl. In these existing plants German produced crude has been used mainly for lubricating oils, while imported crude supplies most of the gasoline or naphtha produced. A quantity of semi-refined oil is imported from the United States, Venezuela (via Dutch West Indies) and Roumania for further treatment in these German refineries. The majority of Germany's refineries are in Prussia, principally in the Hanover and Rhine provinces. This is a natural development, as all four of Germany's oil fields are in the province of Hanover.

In Hamburg, a free city, there has been created a free harbor, where petroleum can be refined and shipped in bond to other European countries free of tariff charges. The refineries at Hamburg and Bremen are said to be controlled by companies outside of Germany, and are operated on imported crudes. Their location is favorable for the importation of crude by ocean tanker from many oil producing countries of the world, although it is understood that they operate chiefly on Mexican, Venezuelan and Columbian crudes.

German refineries have developed a technic of process operation, dictated by the shortage of home produced raw materials, which permits them to produce a maximum quantity of lubricating oils from the crudes processed. The efficiency of this technic has been proved many times by the ability of the refiners to supply German lubricating oil requirements in times when it has been impossible to enjoy free and open markets.

With the rapid increase in recent years of motor transportation in Germany there has been an attendant increase in the demand for gasoline, and naphtha, while the thermal efficiency of the Diesel

engine is making way for it in the power generating fields, requiring more and more distillate as Diesel engine fuel. These increasing requirements call for petroleum processing equipment for maximum production of these products. Until recently a large percentage of the gasoline, naphtha, kerosene and Diesel engine distillate furnished for world consumption has been produced in the United States, Germany taking its share. Increasing production of crude within Germany's territorial limits now permits consideration of the construction of refinery equipment for producing the lighter petroleum products for the German market on German soil and from German crude.

Inasmuch as the greater portion of the refining of petroleum products has been carried on in the United States, it is but natural that her development of processing equipment has reached a maximum efficiency. This is particularly true of the cracking of heavy or reduced crudes. Millions of dollars have been spent in the development of cracking processes in the United States, and out of these millions invested have come some six or eight recognized and practical cracking units which are licensed to the refiner for cracking his charging stock.

These successful cracking processes all differ somewhat in design; but inherently they have to meet the same problems, attendant on handling products at temperatures from 900 to 1,100 deg. Fahr., and pressures up to 1,500 lb. per sq. inch. Advance in the cracking field has been in two distinct directions; first, in process of design; and, second (the most important insofar as successful operation was concerned) in the development of materials and equipment which could be used to construct a cracking unit that would withstand the necessarily extreme operating conditions.

The refiner, in selecting one of these recognized successful cracking units must pay a royalty for its use; but this represents a small charge for the time, energy, and money spent in the development of these processes, as well as rights for the use of the patents covering new and efficient designs.

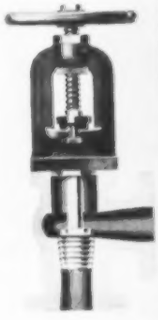
After an extensive study of refining equipment the Elwerath Gewerkschaft decided that for their present refining requirements, inasmuch as they were to process their crude for a maximum of lighter products of petroleum, they would follow the universal practice as developed in the United States. That is, reduce their Edessa in a crude pipe distillation unit having the latest radiant heat type furnace with bubble tower fractionating equipment for the production of gasoline or naphtha, kerosene, Diesel engine distillate and gas oils, the bottoms being charging stock for the Dubbs cracking unit.

The decision was to crack the Nienhagen crude direct, and in the company's study of refining processes the Dubbs cracking unit was selected as the equipment which would best meet their particular requirements. In addition to the crude distillation and cracking unit there is to be the necessary pressure distillate re-run unit, which will be of the pipe still distillation unit type having radiant heat furnace and latest design bubble tower for fractionating products. For treating the products to meet market specifications the latest type of continuous treating plant was selected.

The company, moreover, has taken advantage of the installment of the latest type of vapor recovery and stabilizing units to reduce vapor losses and separate their products, allowing blending to meet definite market specifications. The boiler plant will be a typical plant for the particular type of service required.

The Elwerath Gewerkschaft being controlled entirely by German capital, necessarily were interested in handling as much of the design and construction of their refiuery program themselves as was advantageous. Recognizing, however, the value of the experience and development of the industry in other countries, and particularly in the United States, they retained Arthur G. McKee and Company who are experienced engineers and contractors in the design and construction of petroleum refineries in the United States and other countries. In fact, the McKee Company recently designed and supervised the construction of one of the large refineries located on the South Elbe in Harburg, near Hamburg.

Plans and specifications are being drawn for this refinery in the office of the engineer at Cleveland, Ohio, U. S. A. The greater portion of all materials will be purchased in Germany, and all labor entering into the construction of this refinery will be German, thus permitting German industries to profit fully from this construction program.



Ludlow Valve

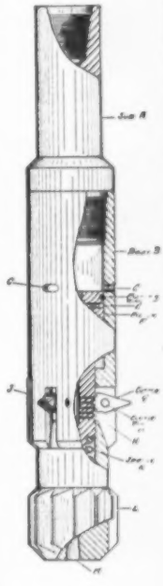
Equipment Notes

Ludlow Multi-Valve

A NEW design of valve recently has been announced by the Ludlow Valve Mfg. Company. The contention is that erosion of a valve seat is due, in the main, to high velocity and density of the fluid handled, and the presence of scale and other solids. Since the kinetic energy of the flow varies directly as the square of the velocity, the erosion varies in a like proportion. Since high velocity is always attendant upon the sudden release of pressure, the elimination of erosion becomes a problem of increasing importance as higher and higher pressures are used in the Petroleum Industry.

This manufacturer maintains that erosion occurs principally in valves with openings of less than 10-1000 of an inch. From this point up to 3/32nds. inch opening, erosion gradually disappears. It is contended that the solution of valve destruction is not in the selection of harder materials for valve seats; but rather the elimination of erosion through the reduction of velocity and density. A nice point, which they answer with the design of a multi-seat valve as illustrated. The multi-valve is designed to decrease the pressure step by step through control of expansion and the back pressure; decreasing the density and velocity of the flow to the point where its kinetic energy can be resisted by existing materials. Instead of the usual single seat, this valve employs five or more; and instead of the usual drop from full pressure to atmosphere, each contact opens into an expansion chamber in which pressure is partially released, density partially lowered and velocity lowered and further reduced.

The heart of the Ludlow multi-valve is the multi-stage plug or cone. This cone is corrugated with specially curved grooves in the side, forming a number of contact lands that seat against the converging wall of the outlet. These grooves form annular expansion chambers, the area of each increasing with the circumference of the cone, thus reducing the density of the fluid step by step and forming separate back-pressure pockets which retard the flow.



New Inside Casing Cutter

THE new inside casing cutter put out by the Shaffer Tool Works is distinguished by ruggedness and simplicity. These cutters are actuated by pressure from the mud pump and cuts can be made in either direction, the knives automatically collapsing when the pressure is relieved and giving a positive indication when a cut has been made. There are two sizes, 3 and 5 inches. It is an ideal tool for breaking out the cement wall or the formation below the casing shoe. There are no complicated mechanisms and cutters are the only extra parts needed.

Casing Cutter

Russia's Refining Industry Reviewed

Vast Program of Construction Now Under Way with View to Producing Over 200,000,000 Bbl. per Annum of Petroleum Products by 1933.

By J. Wegrin

DURING the last year or two interest has been centered on the Russian petroleum industry, particularly on the vast preparations for enlarging the Soviet refining business mainly for entering world markets. The Soviet Oil Trust until now has been mainly relying upon American engineering and American equipment to carry out its program, but plans for the future call for 100 percent domestic construction using, of course, American design as a base. Whether or not this actually will be possible remains to be seen. While much has already been accomplished in the way of new construction, the combined output of all the refineries in Russia is still below the outputs of the several large Dutch, British and American refineries in the Caribbean, which aggregate about 150,000,000 bbl. per annum.

On October 1, 1930, the total crude capacity of all refineries and plants in Soviet-Russia amounted to 126,000,000 bbl. per year, which was to have been augmented by approximately 3,000,000 bbl. up to January 1, 1930, and by a further 6,000,000 bbl. during 1931, but construction has been hampered and delayed.

The accompanying tables give an accurate picture of the progress of refinery construction in Soviet Russia. While the Oil Trust hoped to free itself from dependence on imported equipment information from semi-official sources would indicate that for the coming year this will be impossible. Actually only Soyusneft expects to use all Russian equipment during 1932.

U.S.S.R. Refineries in Operation

Oil Trust	Home Office	Location of plants and number of units	Type Plant	Design*	Maximum daily crude capacity (Bbl.)
Azneft	Baku	Baku.....29	21 topping and straight run	F.W.–W.K.–M.M.	208,000
			8 complete with cracking units	Bad.–Jen.–Dom.	
Azneft	Baku	Batum..... 2	2 complete with cracking units	F.W.–W.K.–Bad.	6,000
Grozneft	Grozni	Grozni.....11	9 old: various types	F.W.–W.K.–Jen.	119,000
			2 complete with cracking units		
Grozneft	Grozni	Touapse..... 1	1 old: various types	not available	6,500
Neftisavodi	Guryev	Leningrad..... 1	1 old: various types	not available	300
Neftisavodi	Guryev	Krasnodar..... 1	1 old: various types	not available	3,000
Ne ftisavodi	Guryev	Konstantinovska. 1	1 old: various types	not available	5,500
Neftisavodi	Guryev	Varinsk..... 1	1 old: various types	not available	3,000
Neftisavodi	Guryev	Uzbek Republic... 2	1 old: various types	not available	400

* F.W.–Foster Wheeler; W.K.–Winkler Koch; M.M.–Max Miller; Bad.–Badger; Jen.–Jenkins; Dom.–Domestic (Russian).

U.S.S.R. Refineries under Construction

Oil Trust Trust	Home Office	Location of Plants and Number of Units	Type Plant	Design	Date Commenced	Percent Complete
Azneft	Baku	Baku.....2	Pipe Stills	Graver	Sept. 1930	15
Azneft	Baku	Baku.....1	Shell Still Battery	Graver	Aug. 1930	50
Azneft	Baku	Baku.....1	Paraffin and dewaxing	Max Miller	April 1930	40
Azneft	Baku	Baku.....2	Cracking Units	Winkler Koch	Sept. 1930	20
Azneft	Baku	Baku.....1	Cracking Unit	Kapelushnikov	Feb. 1930	90
Azneft	Baku	Baku.....1	High Vacuum Still	Pengu-Gurevitch	Aug. 1930	85
Azneft	Baku	Baku.....1	2-twin Cracking Unit	Winkler Koch	Dec. 1929	95
Azneft	Baku	Baku.....3	Kerosene Still	Foster Wheeler	Feb. 1930	85
Azneft	Baku	Baku.....1	Lube-Kerosene Still	Foster Wheeler	Mar. 1930	75
Grozneft	Grozni	Grozni.....4	Cracking Units	Winkler Koch	July 1930	50
Grozneft	Grozni	Grozni.....1	Atm. Pipe Still	Badger	Dec. 1930	..
Neftisavodi	Guryev	Konstantinovka...1	Cracking Unit	Winkler Koch	Aug. 1930	80
Middle Asianeft	Moscow	Kokand.....1	Cracking Unit	Domestic	.....	..
Sakhalinneft	Vladivostok	Chabarovsk.....1	Cracking Unit	Foster Wheeler and Winkler Koch	1931	..

U.S.S.R. Refineries Planned for Early Construction

Oil Trust	Home Office	Location of Plants and Number of Units	Type	Design	Maximum Daily Crude Capacity
Sakhalinneft	Vladivostok	Chabarovsk.....2	Cracking	Winkler Koch	7,000
Grozneft	Grozni	Armavir.....3	Cracking	Winkler Koch	10,500
Grozneft	Grozni	Saratov.....8	Cracking	Winkler Koch	28,000
Grozneft	Grozni	Grozni.....2	Cracking	Winkler Koch	7,000
Azneft	Baku	Baku.....4	.....	Winkler Koch	14,000
Middle Asianeft	Moscow	Kokand.....1	.....	Winkler Koch	3,500
Grozneft	Grozni	Grozni.....1	Pipe Still	Various designs	10,000
Grozneft	Grozni	Armavir.....1	Pipe Still	Various designs	10,000
Grozneft	Grozni	Saratov.....2	Pipe Still	Various designs	10,000
Azneft	Baku	Baku.....3	Pipe Still	Various designs	10,000
Azneft	Baku	Batum.....2	Pipe Still	Various designs	10,000
Azneft	Baku	Baku.....2	Atm.-Vacuum	Badger	20,000*
Maikopneft	Maikop	Krasnador.....4	2-stage Pipe Still	Domestic design	40,000

* Approximately.

Modern Applications of Asphalt

Cold Emulsion Form of Use Steadily Increasing Due to Advantages Over Hot Asphalt. Petroleum Asphalt Sales in U. S. A. Alone Exceeded $35,000,000 in 1930. ***By A. N. Glazener.***

ASPHALT is probably the oldest bituminous product ever used by man, and through the ages it has been used for two distinct purposes: as a binder and as a protective coating. Instances from antiquity of these two uses are as a mortar by the Babylonians and as a preserving material on mummies by the Egyptians.

In modern times asphalt is still used for these two purposes. Asphalt pavements are the outstanding instance of its use as a binder; asphalt paints and enamels are the modern form of protective covering. Asphalt, notwithstanding its valuable properties of durability and plasticity, has several properties which considerably diminish its value. These less desirable properties are: first, in order to apply it, it has to be heated or diluted with light hydrocarbons, two operations that entail fire danger. Moreover, heating is a procedure by which the properties of the asphalt can easily be spoiled. Then, asphalt is after all a liquid, an objectionable property which decreased its value as a protective coating. It is known that if one throws a dime on top of a barrel of apparently stone hard asphalt, the dime will ultimately be found at the bottom of the barrel. These flowing properties of the cold and apparently solid layer of asphalt prevent its application in thick layers, as these layers would gradually sag down. Besides this visible movement there are internal currents in a layer of asphalt, however thin it may be.

Now it is a fact that the action of the sun is harmful to asphalt. Though the penetration of the sun's rays into a layer of asphalt is very shallow, internal currents expose every particle of asphalt to the action of the sun. Consequently, the layer of asphalt, after a relatively short time, has in its whole thickness undergone the destructive action of the sun's rays. It commences to crack, become brittle and therefore valueless.

During recent years, there has been developed a new method of asphalt application, which eliminates many of the difficulties previously experienced. This new procedure is the application of asphalt in emulsion form. An asphalt-emulsion is a fine dispersion of asphalt particles in water by the physical action of an emulsifying agent. The latter prevents the particles of asphalt from coagulating and floating together until such is desired.

There are two main kinds of asphalt emulsions; soap emulsions, and mineral colloid or clay emulsions, which cover approximately the two fields of binding asphalt and protecting asphalt.

Typical emulsion penetrated road. Note non-skid texture.

Digging pitch from the great lake in Trinidad.
Photo. by the Editor

Soap Emulsions for Binding Purposes

SOAP emulsions are characterized by the fact that the asphalt is very finely divided in a watery solution of soap. The division is obtained by mechanical disruption through very fast movement (stirring, for instance). The particles do not flow together because soap molecules form a film upon the surface of the particles, thereby changing the surface tension in such a way that the tendency to flow together is eliminated. We might consider such an emulsion as a mass of foam where every bubble is filled with asphalt. These emulsions are mainly used as a binder. They are called unstable emulsions because as

soon as a part of the water disappears, either by absorption or by evaporation, the particles of asphalt float together and form a continuous film, as if the asphalt had never been in emulsion form.

It is obvious that in road building this material has great advantages over hot asphalt. The stones and sand used for the road are put in place and tightly rolled and then the emulsion—made at such a thickness that it will penetrate to exactly the required depth—is spread over the road. There is no cumbersome heating equipment necessary; there is no fear that by cooling down, the asphalt may lose its fluidity and not penetrate far enough; there are no obnoxious and dangerous vapors present as is the case with cutbacks.

Most important of all, the work is much more independent of climatic conditions. Whereas on a rainy day it is very risky to apply hot asphalt, as this hot asphalt would not adhere to the wet stones, the watery emulsion is independent of this. Unless it is actually raining, so that the emulsion might be washed away, there is no objection to applying it to a moist road; on the contrary, in very dry weather it may be advisable to moisten the road somewhat before an application of emulsion, as otherwise the coagulation might go too fast. The only condition necessary for quick setting of the asphalt is that the water has an opportunity to evaporate. It must not, therefore, freeze, and when the weather is very moist, there must be some wind. How moist the weather may be does not matter provided a current of air blows over the treated surface.

Soap emulsions can be made in a more stable form, which does not coagulate until practically all the water has disappeared. These stable forms of emulsions are suitable for building roads by the mixing process. The aggregate is mixed in concrete mixers with the stable asphalt-emulsion and thereafter carried to and spread over the road. After a slightly longer time than necessary with the usual emulsion work, sufficient water has disappeared from this mixture, so that it will set. That is, the particles of asphalt will float together to form a film on the surfaces of the aggregate, providing a binder of asphalt cement with the proper characteristics.

Clay Emulsions as Protective Coating

A STILL more interesting development of the application of asphalt has been opened with the invention of clay emulsions. In these emulsions the particles of asphalt are also formed by disruption through stirring in water. Coagulation of the asphalt particles is here prevented by the presence in the water of a small quantity of special kinds of clay, or clay-like mineral colloid. The clay particles coat the asphalt globules and in this way keep them separate just as pills in a box are prevented from sticking together by coating them with flour.

Semi-penetration work with asphalt emulsion. Good results are secured in moist or damp weather.

When this kind of emulsions is applied, it also "sets" upon the disappearance of the water. There is, however, a difference with the setting of a soap emulsions. The film of asphalt which is formed is not a film, just as if the asphalt had never been in emulsion form, because the coagulation of the particles of asphalt takes place only to a limited extent. This goes so far that renewed immersion in water will not cause re-emulsification; but, on the other hand, the clay particles remain divided through the asphalt layer as a fine skeleton. This skeleton of clay which consists only of 3 percent of the total mass is evenly and systematically distributed through the whole film of the dry layer, and it is obvious that this imparts to the layer very special properties. A layer of even ⅜ inch thickness on a vertical plane will not sag because the asphalt is no longer free in its movements.

Even if we heat this layer to far above the melting point of the asphalt, there will be no flow. Also, the internal currents already described, which cause in a pure asphalt layer the gradual deterioration of all the asphalt, are done away with. Consequently the lifetime of a layer of asphalt applied through the clay emulsion stage is much longer than that of an ordinary layer of asphalt.

These clay emulsions have opened for asphalt many possibilities where formerly the less desirable properties of asphalt excluded it from use. It is obvious that clay emulsions have, besides their intrinsic advantages, also the same advantages of the soap emulsions; that they can be applied under the same circumstances of moisture, etc., which often make the application of hot asphalt or cutbacks very difficult.

Owing to its special properties and its great stability, clay emulsion can be applied in inumerable ways where the incorporation of a resilient, durable and waterproof material like asphalt is advantageous. A few of these applications are as a coating for iron work and pipelines, and as waterproof coating on and between walls. It can be incorporated with cement and aggregate to form a resilient and waterproof concrete floor. It can be used as a mastic for setting deadlights. It is suitable for waterproofing heat insulating material, and to waterproof cork insulation for refrigerating purposes. Owing to its great stability, it can be mixed with paper stock and consequently be incorporated in dense paper, which could not be saturated with asphalt. Paper board made in this way has very interesting thermoplastic properties which permit it to be pressed into all kinds of shapes.

[A comprehensive survey of the asphalt production and marketing situation has recently been published by the U. S. Department of Commerce, the figures including U. S. imports and exports. Petroleum asphalt sales in America during 1930 amounted to 3,326,378 tons valued at $35,380,620.—*Editor.*]

World's Largest Petroleum Refinery

Royal Dutch-Shell Plant at Curacao, D. W. I. Has Annual Capacity of 90,000,000 Bbl. of Crude, and a Total of 10,000 Employees.

PETROLEUM today, may be considered more international in character than any other product, which accounts for the great fleet of 1,300 tankships aggregating over 7,500,000 tons, and costing over $800,000,000 carrying oil on the seven seas—of which the Royal Dutch-Shell group operates 2,261,903 tons. The enormous investment in these vessels has been necessary in the strenuous effort to develop and maintain world business in crude and refined products. Lately, however, the severe and increasingly powerful competition from oil companies of other countries, many of which have production and refining nearer the points of consumption, has made it essential to locate big refineries at strategic points on the high seas.

The Royal Dutch-Shell's business has always been international, and its management on many occasions has alertly anticipated changing trends in movements of petroleum and in directions of flow, such as now are taking place due to price cutting by Roumania, the rush of oil from Russia, and the forthcoming streams of crude from Iraq and Colombia.

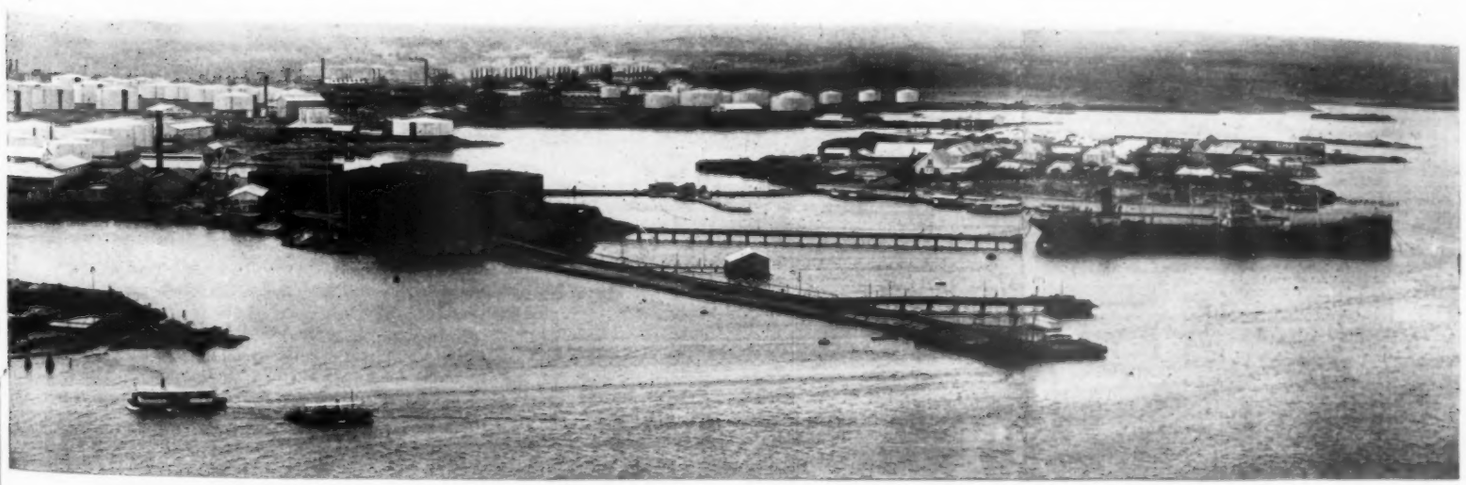
Situated where it can be fed by crude from U. S. Gulf ports, Mexico, Venezuela, Colombia and Trinidad, the Dutch West Indies—with its liberal laws—is an ideal location for both refining operations and shipment of products. Close to the Panama Canal and adjacent to the marine highways of commerce, these islands are strategically situated for world marketing and transportation, a fact recognized by these British-Dutch interests, in building at Curaçao the largest refinery in the world, having a daily capacity of 250,000 bbl. of crude.

The plant is located on a peninsular at Emmastad in the inner harbor of Willemstad and today draws its crude from the various Venezuelan oil fields, whence it is shipped by shallow-draft tanker. The particular formation of the granite-coral inner harbor affords the refinery a large number of deep water piers where seagoing tankers load for all parts of the world.

Preliminary work on the refinery was started in 1917; but owing to the war it did not become one of the world's largest topping and cracking plants until 1924. Further extensions were then made, and by 1930 a yearly capacity of 90,000,000 bbl. of crude was reached, although this full output has never actually been attained owing to the curtailment steps taken last year, which were necessitated by international conditions in the oil industry. Altogether there are about 10,000 people employed in the refinery, although this number has been reduced somewhat of late.

There are in operation fourteen large Dubbs cracking units for fuel oil and thirteen Trumble topping units for handling crude oil, some of which were designed by Foster Wheeler. In addition there are two Cross units for cracking solar oil. One of the latest additions is that of a gasoline blending plant at Bullen Bay several miles from the refinery proper, which is one of the most up-to-date installations of its kind. It is connected with the refinery and the 2,500,000 bbl. tank farm by pipe line, as are the four new loading piers at Caracas Bay. Last year about 60,000,000 bbl. of crude oil were refined at Curaçao, which doubtless is a greater quantity than that handled by any other refinery in the world, although as stated the quantity is 30,000,000 bbl. short of the actual capacity.

The plant is under the direction of C. E. Van der Stok, while J. Noorduyn is the plant manager with J. de Pril as assistant manager. Now nearing completion several miles from the plant is a modern brick construction settlement.



Part of the Curacao refinery. 14 Dubbs cracking units; 13 Trumble topping units, and 3 Cross cracking units. Annual crude capacity, 90,000,000 bbl.

H. L. Doherty Explains A.P.I. Resignation

Prominent American Oil Man Gives Frank Statement for Severing Association with Petroleum Institute in Letter to President E. B. Reeser which World Petroleum Prints in Full.

I WAS pleased to receive your letter and was flattered when told that the Board of Directors of the American Petroleum Institute had unanimously voted not to accept my resignation.

I did not immediately reply to your letter because I wanted to again carefully review the entire situation from the standpoint of what was best for everybody. I had made up my mind definitely and sometime ago to retire from the Board. I thought it would be best simply to say that I wanted to be relieved of any responsibility and say nothing that would by any chance be again constructed as unpleasant or offensive, and simply bow myself out in a way best calculated to strain no more friendly relations when no sufficient good seemed to come of it.

I now feel that I cannot, with honesty to my past position or with such duty as I may still owe to the industry and to my fellow members of the Board, simply rest my resignation on the desire to avoid further responsibility. What I say now, however, I do want you to know is said with no desire to be unpleasant or to be offensive.

I regret that I have ever spoken in an unpleasant or offensive way to or about anybody else in the oil business; but, I feel whatever I have done was fully justified as the best means I could conceive to avert the serious situation that now confronts us, and, therefore, I want to make this brief statement to you and to the other members of the Board.

It is my opinion that any man willing to give careful thought to the problem should have been able to foresee, for at least the past fifteen years, that the oil business was headed for the rocks, and that our present methods were radically and inexcusably wrong, and that the place to start to correct our conditions and to lay the foundation for better conditions for our business was in the production end of the business.

I have been pushing, as earnestly and aggressively as my other duties and health would permit, to evolve plans and to initiate reforms to prevent the serious consequences which now confront us. I have been in the minority at all times on every important feature of these reforms, and have generally been in the hopeless minority with every other vote on the Board, or on the various other committees against me.

It is true that many of the men in the oil business now concur in many of my early plans; but, in the meantime, errors have been committed which make it more difficult to correct the situation. New faces and new plans are coming to the front, or perhaps I should say, the same old plans in a new disguise, and I find, after all of these years, that I have been continually out of step with the leaders of the oil business and that today I am perhaps not in sympathy with anything that is being proposed or offered by anybody else for a solution of our troubles.

Without wishing to offend, I am compelled to say that my position is the same now as always and that from the time I first took up the movement to stabilize the oil industry, I think nothing of importance has been done by the leaders of the oil industry of the many important things that should have been done, and that everything that has been done of any importance was a mistake.

I feel that the errors which confronted us immediately after the close of the war must still be corrected, plus all of the unnecessary errors that have been contributed by those who have assumed to say what should or should not have been done, or by those who have been responsible for seeing that that was done which would make the industry safe for the future.

I don't care to rehearse any of these mistakes except by way of example. When I recommended to the Executive Committee, cooperation by all of the units in the oil industry to do those things which could not be attempted by the individual units, and especially the matter of the protection of our then existing markets, I could get no favorable response, but, in some cases, had active opposition. The Executive Committee finally offered to provide for the Committee, of which I was the Chairman, $6,000 a year to carry on the cooperative work for the entire nation, including the development of appliances and national advertising. Later they raised this to an appropriation of $25,000 a year, which, of course, was so wholly inadequate that I was unwilling to accept the expenditure of it.

Each and all of my plans were either rejected or ignored. At a Board meeting held at the Biltmore Hotel in the Summer or Fall of 1923, the plans for the Unit Operation of Pools was referred back to the original committee, and the committee enlarged by placing on it practically everybody who disproved of it in advance. I was unable to get favorable action from this committee and, in fact, any change in our methods was, if necessary, vigorously opposed, and all chances effectively blocked. I urged and I pleaded. I finally stated—not by the way of threat, but to let them see the danger of it—that if they would not do anything for the protection of the oil industry and the natural petroleum resources of the nation, that I would take the matter up with the Federal Government. Every member of the committee was duly notified of that fact as were the officers of the Institute.

After several delays, in which I hoped to receive some assistance or compromise, I did take the matter up with the Federal Government. Later, when the oil men commenced to realize the Federal Government was considering doing something about it, they opposed it in the most active way and represented to the officials of the Government, who carried their views to the President, that if my plans were adopted, it would so restrict the production of oil that gasoline would go to fifty cents a gallon.

In spite of this campaign, President Coolidge appointed his Federal Oil Conservation Board in December, 1921. The next month, at a Directors meeting held in Atlantic City for two days, the committee first offered a resolution, which was at first passed and later modified. The first resolution said that part of my plans would so restrict the drilling for oil that it would be impossible for the oil industry to produce an adequate supply. The resolution was afterwards modified.

I have no copy of it with me here, but it says substantially the same thing.

I was roundly denounced to other members of the Petroleum Industry by many of my associates in the American Petroleum Institute as being a most dangerous enemy of the business, and the statement was frequently made that I was trying to put the industry into the hands of the Government.

I have remained silent regarding these charges and I don't know that it will be necessary for me to make it plain that these charges were absolutely without foundation. But, I may be compelled to do so simply that I will not be further handicapped from doing what I may for the good of the industry.

In February, 1927, at a hearing before the Federal Oil Conservation Board, I heard one of the most prominent members of the Board of Directors of the American Petroleum Institute get up and make an impassioned plea for cheap gasoline. He made it quite plain to the members of the Federal Oil Conservation Board that they should not do anything that would prevent the public from getting their gasoline at the lowest possible price. While this address received very favorable and enthusiastic applause by nearly all of the oil men present, my statements were not so well received. On many occasions in our own meetings, my statements had even been antagonistically received, and when I pleaded for a few more minute's time at the January meeting of the Directors in 1925 to answer what had been said by some of my opponents, I was peremptorily denied any further time by the chairman.

The oil industry has lost billions of dollars since I took up my work and I believe they have done so unnecessarily. Those who have opposed many of the obviously correct plans which I have recommended from time to time have enforced a loss on my stockholders, in my opinion, of more than half-a-billion dollars. Nothing is being done or planned now that I think gives reasonable promise of relief at any time, and certainly not in the immediate future, and things which might be done are not even being considered, while things which might be tried are not even being tried.

The plans that are now on foot and that are apparently being backed up by the American Petroleum Institute, are, in my opinion, impossible of being enforced if legally contested. These plans are dangerous in the extreme, and any enemy of the industry can now insist that the Federal Government be asked to do nothing more until ten States have agreed on a uniform program. This, in spite of the fact that in some of these States the legislature doesn't meet for another two years, and that there would be no evidence to which we could point over the past years to make us believe that we would get ten of these States to agree to a uniform plan in ten years, even though the legislatures are in continuous session.

It is my opinion that the present plan of correcting our difficulties is fraught with great danger to the industry, and I even doubt that Congress would ever be induced to ratify a compact between the States, if the States could be induced to make such a compact.

There are some things in connection with the work of the American Petroleum Institute that please me very much. For many years it seemed as though the Directors felt that to serve on the Board was a mere honor to them and carried no responsibility with it. For nearly a year now, after having wasted more than ten years of time, there is evidence on the part of the Directors of giving serious consideration to our problems, and to the recognition that no entity in an entire industry can be safe if the industry itself is basically wrong.

I think the American Petroleum Institute should take up and reconsider every action they have taken on this matter. It is my opinion that every industry ought to clean its own house before it starts out with the idea that it can safely ask and expect to get, in the end, public support.

The lawyers of the industry, I think, have been particularly wrong in the position they have taken. I am sorry to say that I don't believe that they could possibly believe the correctness of the position they did take; but were simply enjoying the privilege that most lawyers think they have of misrepresenting the facts. Regardless of misrepresenting the facts, I am not sure that even one lawyer out of every hundred in the oil business knows what an oil property consists of, or how it must be operated to comply with natural laws, or how it must be operated to comply with the decisions that have been handed down by the courts regarding the operation of other properties which are by nature jointly owned.

The lawyers have, in this case and in most instances, been tossing around opinions without knowing what the evidence really was. Most of them have hid behind the fence and have thrown mud, and have been unwilling to meet me or anybody else before a fair tribunal, or even a tribunal of their own choosing.

I am sorry to request that my resignation be received and to state that I do not want to be bound, regarding the present oil situation or how to cure it by any man or group of men in the business. In other words, I do not want anyone to be regarded as speaking for me or for me to be regarded as speaking for anybody else but myself.

It has been most unpleasant for me to have been all of these years in the hopeless minority, and of such things that I may have done in the way of criticism or matters of that sort, I believe were fully justified if only to try to stir up a recognition of the serious plight which threatened us.

I have no plans, and want to again assure each and every one of you that I am willing to work and accept the directions of others, if I can believe these directions are the result of careful thought and will bring results.

I say earnestly that I have never worked with a set of men that I have personally liked better than I have the oil men. It is certainly regretted by me that it has never been possible for me to see their methods as being right, or for them to see my recommendations as being right. However, I feel that one of the qualities of the oil men which I like best is the fact that they can and will pass fair judgment even on those who are not completely in step with them, or men like myself who at times have been completely out of step with them.

It is probably needless to add that I will not be present at the meeting at Fort Worth.

Yours cordially,
(Signed) HENRY L. DOHERTY.

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Petroleum Engineering Handbook

ANNOUNCEMENT is made of the second edition of the Petroleum Engineering Handbook. This handbook is produced each year by the publishers of WORLD PETROLEUM of New York and London, and PETROLEUM WORLD of Los Angeles.

All the material is new, written by petroleum technologists especially for this issue. Some forty different engineers have contributed to this book, each an established authority.

Approximately half of the editorial content this year is devoted to refinery processes; a substantial section to pipe line and transportation problems and the balance of the book to development and production, most of the latter dealing with Mid-Continent practice.

Water White Color in Motor Fuel

Refiners Admit Lack of Connection Between Color and Quality, But Furnish White Gasoline in Response to Believed Demand. By Paul Truesdell, Gustav Egloff, and J. C. Morrell.

THE theory that sparkling crystal clearness—water whiteness—is a necessary mark of good gasoline, has for years been costing American refiners large sums of money. This idea, long fostered by refiners and marketers themselves as a selling point has become pretty firmly fixed in the minds of American motorists.

Lately, however, this notion has been somewhat amended. The public now generally looks for a gasoline either approaching water whiteness or else dyed some distinctive color, such as red, yellow, blue, green or other hues of the rainbow.

The fact is that refiners are now making and selling gasoline different from that which was generally marketed a few years ago. By nature, the gasoline of that day was water white. By nature, much of the gasoline made today is yellow.

This yellow gasoline is different in gravity and chemical constitution, as well as in color, from that of a few years ago. It has to be different because the automobile engines of today differ from those of yesterday in their motor fuel require-

The new gasoline meets these requirements of high knock rating and other characteristics. Yet we still try to make this chemically different product conform to the same color standard.

As a matter of fact, refiners themselves have adopted the term "off-color" for gasoline that has the yellow tinge characteristic of modern motor fuel.

Capitalizing Color

WOULD it not help to erase the words "off-color" from the language of the trade and call it, instead, 16 or 18 or 25 color? We might even brag about its being yellow as a proof of its anti-knock value and be well within the truth.

Color in itself has no effect upon the quality of a motor fuel. It is significant in this connection that the Federal Specifications Board, which, by means of drastic specifications, rigidly safeguards the quality of the petroleum products bought by the government, long ago removed color from the list of qualities it demands in gasoline for government use.

It has been believed by many that a yellowish color in the gasoline indicates a tendency to form gum, but this has been proved by no means to be the case.

Crystal clear gasoline may form a large amount of gum upon standing, while a distinctly yellow fuel, on the contrary, may remain gum-free after long periods of storage.

While the problem of gum in gasoline is universally recognized, it is not completely understood. It is certain that a large amount of gasoline is being drastically, expensively, and unnecessarily treated with sulfuric acid to "water-whiteness" under the mistaken impression that such treatment is necessary to insure reduction of the gum content within accepted limits.

COLOR having no effect on the quality of motor fuel, the authors of this article,—which is one of a series of three,—question the wisdom of a marketing policy that has the effect of educating the motoring public to expect water white color in gasoline. The attitude of refiners toward the problem has been determined by these cracking experts through questionnaires sent to representative companies throughout the United States. The experience of jobbers and refiners, and the attitude of the public, in relation to water white, dyed, and yellowish motor fuel, are also set forth in this interesting contribution dealing with the question of color.

Refiners' Attitude

IN order to determine the attitude of refiners toward treating for color and their experiences and ideas in connection with it, the Universal Oil Products Company sent out a questionnaire to about 100 American refiners, representing large, middle-sized and small companies.

The questions asked these refiners were as follows:

Does your trade demand water white gasoline and do you furnish it to them?

Do you sell any gasoline of, say, 16 color?

Do you have cars rejected frequently on the claim that they are "off-color?"

Do you sell gasoline below 16 color at your own stations and does the public accept it?

Does the treating of gasoline to water whiteness cost your company a substantial sum?

In other words, does the demand for water white gasoline come really from the motorist, or does it come from the jobber or dealer who holds this color specification as a club over the refiner to force concessions by rejecting cars as "off-color?"

The substance of the answers received are set forth in this article, and in two others which are to follow.

Most of the refiners who answered the questionnaire are well aware that color by itself has nothing to do with the quality of gasoline, but they are of the opinion, based on experience, that unless gasoline approaches crystal clearness or is dyed a distinctive color it is not readily salable.

A refiner who has had years of experience in marketing gasoline and is

now running a plant in Texas, writes as follows:

"We think it would be a commendable work to educate the public that the color of gasoline has nothing to do with the quality. It is our experience, based on jobbers' demand, as well as the filling station attendants, that the public is reluctant to buy any but water white gasoline unless it is some special brand colored red, blue or green."

An Oklahoma refining company executive sees the color situation as he reports in his letter:

"Our sales department reports that a great many jobbers as well as motorists associate color in gasoline with gum or poor refining. Regardless of the facts in the case, it is wise to supply the public with what it thinks it wants."

A Pennsylvania refiner puts it this way:

"Several of the larger companies are putting out a very yellow gasoline, and some of the rest of them are just simply putting in a little dye to color the gasoline so they won't have to show that it is yellow."

Problem Is Serious

THE color problem is not confined to any one section of the country. It is serious everywhere. A refiner who operates a refinery and an extensive marketing business on the eastern seaboard, writes as follows:

"In spite of the fact that the motorist will accept gasoline dyed with all the colors of the rainbow, he nevertheless is suspicious of white gasoline if the color is inclined to be "off." This I have noticed in service stations having visible pumps."

Across the continent, a California refining and marketing company of medium size reports that yellowish gasoline will not sell in its marketing territory.

"Unless gasoline has been artificially colored or is at least 25 plus color," they write, "it cannot be sold in this territory without great sales resistance. Our experience has been that below 25 plus standard gasoline will injure our trade faster and do greater damage than any other one quality."

An official of a large Pacific Coast refining and marketing company states his company's attitude as follows:

"We would be happy to render any assistance we can in the effort to convince the public that it is not necessary that a good gasoline be either water white or dyed some definite color.

"The only evidence we have had that the public in general is unwilling to accept dark colored motor fuel is the fact that we have had complaints when our gasoline through contamination or ageing has materially departed from water whiteness."

In the West

A REFINER marketing in the far West has trouble with his customers on the subject of color. He says:

"We find the public generally is hard to convince that yellow color is a sign of good gasoline rather than poor. It is impossible for us to sell gasoline in this territory below 16 color."

A large refinery and marketing company in the Northwest reports that: "the majority of our accounts are strictly committed to water white products, which prohibits their use of our cracked gasoline which is not up to the color specifications of our straight-run. In our own case, our water white gasoline runs 30 plus color."

A short but positive statement is contained in the letter of an executive who has had wide experience in refining. His company markets in a south central section of the country. He writes:

"It has been my experience that color is an important factor in the marketing of gasoline and our trade insists that it must be water white, or dyed some definite color."

Another refiner marketing in a middle western state, says:

"At present our trade demands and we furnish to them water white gasoline not less than 25 color."

Dyed Fuel in Pennsylvania

WATER white gasoline is necessary to meet the ideas of the trade in Pennsylvania, according to a letter from a Pennsylvania refiner. Even dyeing the gasoline didn't go very well there in his case. He says:

"It is our experience that our trade, in particular through our own stations, requires a water white gasoline. We notice particularly where visible pump globes get dirty on the inside we have a great deal of criticism. We tried out coloring gasoline as an experiment but so far it has not gone over as we had anticipated."

A Mid-Continent refiner finds that the public has been too well educated to the idea of water white gasoline. His letter says:

"A great many concerns have preached water white gasoline so long that the motorist has been educated to it and while we know that color has absolutely nothing to do with the quality we also know that we have to give the motorist what he wants."

An executive of a large refinery on the Atlantic seaboard echoes this same cry:

"Our belief is that the motorist will prefer and demand water white gasoline so long as it is available."

That at least in some territories the motorist prefers an inferior gasoline if it is water white to a superior motor fuel that is yellow is indicated by the experience described in a letter from a refiner of Pennsylvania crude oil. This executive says:

"For several of our stations we are buying gasoline from a concern that, while they furnish us a very good quality so far as anti-knock is concerned, yet, it is yellow and the public does not take to it very kindly. This in spite of the fact that it is really better than the gasoline we are selling at other points, although the latter is water white."

Sulphur and Gum

IN contrast are the comments from some companies that maintain the policy of putting out only water white gasoline. One from a large Pacific Coast company says:

"In a general way it must be granted that color is itself of no consequence. An engine would probably operate on yellow gasoline if color were the only consideration. Yellow gasoline, however, usually has undesirable qualities besides color. It is nearly always high in gum and, particularly on Pacific Coast crudes, is high in sulphur, so that color to some extent is a measure of quality. We have always taken the position that quality is of the utmost importance between our company and the consumer and to drop our color requirements would, in turn, mean dropping sulphur and gum specifications, all of which would certainly lower quality, and we prefer to maintain the high standard for which we have always striven."

Another company marketing in many territories has this to say concerning the color problem:

"We gave long and serious study to this problem before we began coloring our gasoline its present shade. We did not want to use dye if it were possible to market yellow gasoline.

"At that time we came to the conclusion, and a good deal of testing since then has substantiated it, that color is a pretty fair index of thoroughness of refining, and that the public is right in its antagonism to yellow gasoline.

"Most of the yellow gasolines that we have seen and tested have shown either too high sulphur or too large a percentage of unstable saturants, the result of their use being clearly indicated in

the crankcase pitting, carbon forming tendencies or gum content."

A similar position is taken by a Mid-Continent refining company:

"We, of course, know that it is possible to have good gasoline 'off-color,' but we also know that off-color gasoline may indicate heavy and undesirable products contained therein. Our trade demands water white gasoline and we furnish it. We sell nothing below 16 color. We practically never have cars rejected for color because we do not ship it 'off-color.' "

No Serious Objection

AMONG the answers to the color question, there were those from refiners who have not found any serious objection among their customers to yellow gasoline.

A refiner marketing in a middle western state writes:

"With the various colored gasolines offered the public today there is little if any objection to a yellow gasoline."

Another company in the same section reports similarly:

"We have not had one complaint on color in the last two years, even though we were marketing a benzol-gasoline blend which has a tendency to become very yellow in the sunlight."

A Pennsylvania refiner says:

"We sell both through our own stations and at wholesale. Consequently we can say that for the past few years the motorists raise no question whatever about the color of the gasoline. The truth is that many, if not a large majority, of motorists seem to prefer some colored gasoline (yellow, blue, red, etc.), apparently feeling that the color adds some value. It is our experience that they accept a burnt or discolored gasoline in the same manner, for we have repeatedly bought such gasoline on the outside for our own stations, and still never experienced any complaint on color the past few years."

This refiner believes, however, that his trade would not accept a gasoline as low as 16 color.

"We agree that color itself has nothing to do with the quality of gasoline and it certainly would simplify matters if the public accepted color as immaterial," writes an executive of a very large refining and marketing company.

This company treats its cracked gasoline to a 25 Saybolt color, but the letter goes on to state:

"It is, of course, unavoidable that gasoline standing in the sunlight in the glass bowls of filling station pumps turns a yellow color; but we have few evidences that the public objects to such yellow gasoline."

Distinctive Dyes

SOME refiners have solved the color problem by using distinctive dyes for all the gasoline they sell.

A refiner in a southern state writes:

"Undoubtedly the color problem will become more serious as the demand for regular motor gasoline of high anti-knock value continues to grow. So far as our own situation is concerned, the color problem was solved to a great extent, after we first began producing cracked gasoline, by coloring the gasoline. Originally a large part of our cracked motor fuel went into the manufacture of Ethyl gasoline where color was not of importance because the material was dyed red."

A Pennsylvania refiner has met the color problem by selling only colored gasoline. He says:

"We market the gasoline we produce only through our own bulk stations. We distribute a motor gasoline that is dyed a distinctive color and Ethyl gasoline which is, of course, the regular Ethyl color."

Another Pennsylvania refiner finds the same solution adequate. He reports:

"All our cracked gasoline is sold either in the form of a purple non-premium gasoline or in the form of Ethyl gasoline, so the matter of yellow cracked gasoline does not concern us."

Influence of Cracking

THE vice-president in charge of sales of a very large refining and marketing company operating in the middle west sets forth his ideas on the subject of color so clearly that his letter is quoted practically in full. He aptly sums up the situation and its causes:

"In our estimation there are many factors that have brought about the belief on the part of the dealer and the consuming public that good gasoline must be water white. First and foremost was the natural demand for anti-knock gasoline as compression ratios of automobiles were raised. Up until the time when the Ethyl Gasoline Corporation came into the picture no one, including the automobile manufacturers, paid any particular attention to the anti-knock qualities of fuel.

"Gravity and volatility were the qualities stressed. Also, this was before the days when cracking played any material part in the oil industry, and water white gasoline could naturally be produced to retain its color almost indefinitely by straight-run methods. As cracking became of major importance in about 1921-22 at the time of the crude shortage, gasolines began to go yellow and polymerize in the sunlight.

"Many refiners at this time started to ballyhoo their production as straight-run and water white. Ethyl gasoline came into the picture about this time and worked hand in glove with refinery improvements in cracking in order to cut down on the amount of lead necessary to meet the Ethyl specifications.

"This was all very good with respect to Ethyl gasoline which was required to be dyed red; but refiners began to cut deeper and deeper into the barrel of crude by cracking; compression in automobiles was raised higher and higher, and it was necessary to improve non-premium white gasoline. It was then really when the trouble started.

"Last spring, when we decided it was necessary for competitive reasons to materially increase the anti-knock properties of our non-premium gasoline, we began to encounter serious resistance from the trade, as well as from the consuming public, because this high knock-rating gasoline would turn yellow.

"It was so serious that in many instances sales began to suffer, so we put on a large advertising campaign announcing a new and improved dyed gasoline. We chose an amber colored dye because our cracked gasoline would soon polymerize in the light to yellow and the amount of dye necessary to use was small and correspondingly cheap and the finished product was very attractive and rich in color."

[The second of these three articles on color in motor fuel will appear in the August issue of WORLD PETROLEUM. It will deal with the change in public opinion on the subject of gasoline as seen by some refiners and marketers. Meanwhile, WORLD PETROLEUM will be glad to receive for publication the opinions and experiences of motor fuel distributing organizations and refiners in other countries.—EDITOR.]

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During 1930, 1,785,913 bbl. of motor spirit was produced in Burmah as well as 3,871,323 bbl. of kerosene. Both these quantities were increases over the year 1929. The Badarpur refinery of the Burmah Oil Company and the Digboi refinery of the Assam Oil Company together produced 410,263 bbl. of kerosene and 210,874 bbl. of motor fuel. In the Punjab refinery of the Burmah Oil Company 172,446 bbl. of kerosene and 165,639 bbl. of motor fuel were also manufactured. These also are increases over last year.

Petroleum Refineries of the World

Arranged by Countries–Excluding the United States

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
ARGENTINE					
Cia Astra	Buenos Aires	Comodoro Rivadavia	2,380	Oil fuels only	Old
Cia Ferrocarrilera de Pet	Buenos Aires	Comodoro Rivadavia	8,190	Oil fuels only	Modern with cracking equipment
Cia Itaca	Buenos Aires	Campana	2,100	Complete line	Partly modern with cracking equipment
Cia Itaca	Buenos Aires	Campana		Complete line	Partly modern
Cia Nacional de Petroleos (Ltda)	Buenos Aires	Campana	10,500	Complete line	Modern
Cia Nacional de Petroleos (Ltda)	Buenos Aires	Bahia Blanca	2,100	Oil fuels only	Modern
Diadema S. A. (Royal Dutch)	Buenos Aires	Dock Sud Zone, Port of Buenos Aires	3,500	.....	Building with cracking equipment
El Condor (Cia Gral de Comb)	Avellaneda	Avellaneda	350	Oil fuels only	Old
El Condor (Coppock & Mories)	Avellaneda	Avellaneda	350	Oil fuels only	Old
General Fuel	Buenos Aires	Buenos Aires	1,000	.....	Building
La Isaura	Bahia Blanca	Bahia Blanca	350	Oil fuels only	Old
La Petrolera Argentine (Marianoff)	Buenos Aires	Avellaneda	175	Oil fuels only	Old
Lottero y Gorleri	Buenos Aires	Avellaneda	210	Oil fuels only	Old
Manuel Elordi (Standard Oil Co. of S. A.)	Buenos Aires	Embarcacion	500	Oil fuels only	Old with cracking equipment
Yacimiento Petroliferos Fiscales (Argentine Government Oilfields)	Buenos Aires	La Plata	14,000	Complete line	Modern with cracking equipment
Yacimiento Petroliferos Fiscales (Argentine Government Oilfields)	Buenos Aires	Comodoro Rivadavia	1,120	Complete line	Old
Yacimiento Petroliferos Fiscales (Argentine Government Oilfields)	Buenos Aires	Plaza Huincul	700	Oil fuels only	Old
AUSTRALIA					
Commonwealth Oil Refineries Ltd.	Melbourne	Laverton (Kororiot Creek)	2,000	Gasoline, kerosene and fuel oil	Partly modern
Newport Oil Ref. Pty. (Ltd.)	Newport	Newport	60	Lubricating oils	Runs part time
Shell Co. of Australia (Ltd.)	London	Clyde, Near Sydney	2,300	Gasoline, kerosene and fuel oil	Partly modern with cracking equipment
Vacuum Oil Co.	New York	Plan to build a large refinery near Melbourne		Gasoline, kerosene and fuel oil	Modern
AUSTRIA					
Ludwig Barnauer	Vienna	Lanzendorf	....	Lubricating oils	Lubricating plant
Credit General des Petroles	Paris	Droesing	420	Distills only residue	.....
Danubia Mineraloelindustrie A G (Gallia)	Vienna	Vosendorf	1,000	Distillates, gas and fuel oils	Modern topping and lubricating plant
David Fanto & Co.	Vienna	Lanzendorf	....	.....	Shut down
Korneuburger Mineralolraffinerie A G	Vienna	Korneuburger	1,000	Lubricating oils	Modern
Shell Floridsdorfer Mineraloel Vertriebes G m b H (Royal Dutch)	Vienna	Floridsdorf	860	Complete line	Modern
Vacuum Oil Co.	Vienna	Kagran	150	Gasoline	Modern
BELGIUM					
Belgium Cracking Co.	Brussels	Langerbrugze	300	Gasoline	Modern with cracking equipment
Burt, Bolten & Haywood	Selzaete	Selzaete	....	.....	Not operating at this time
Raffineries Nationales de Petrole	Brussels	Selzaete	1,200	Gasoline	Modern with cracking equipment
BOLIVIA					
Standard Oil Co., N. J.	La Paz	Sanadita	200	.....	Small skimming plant
Standard Oil Co., N. J.	La Paz	Camira	200	.....	Small skimming plant
CANADA					
Alberta Refining Co.	Edmonton	Edmonton	350	.....	Not operating
British American Oil Co., Ltd	Toronto	Toronto	7,200	Complete line	With cracking equipment
British American Oil Co., Ltd	Toronto	East Montreal	....	.....	Under consideration
Canadian Oil Cos., Ltd	Toronto	Petrolia	1,200	Complete line	Complete plant
Home Distributors	Vancouver	N. Vancouver	600	Gasoline, kerosene and fuel oil	Skimming plant
Imperial Oil, Ltd.	Toronto	Calgary	5,000	Gasoline, kerosene and fuel oil	Skimming plant
Imperial Oil, Ltd.	Toronto	Ioco, Vancouver	12,000	Gasoline, kerosene and fuel oil	Skimming plant with cracking equipment
Imperial Oil, Ltd.	Toronto	Dartmouth	17,000	Complete line	Complete plant
Imperial Oil, Ltd.	Toronto	Sarnia	22,000	Complete line	Complete plant
Imperial Oil, Ltd.	Toronto	Montreal	30,000	Complete line	Complete plant
Imperial Oil, Ltd.	Toronto	Regina	7,200	Complete line	Complete plant
Invincible Oils, Ltd.	Wainwright	Wainwright	100	.....	Not operating
McColl-Frontenac Oil Co., Ltd.	Montreal	Toronto	5,000	Gasoline, kerosene and fuel oils	Skimming and cracking plant, new equipment
McColl-Frontenac Oil Co., Ltd.	Montreal	Montreal	5,000	Gasoline, kerosene and fuel oils	Skimming and cracking plant, new equipment
McColl-Frontenac Oil Co., Ltd.	Montreal	New refinery contemplated for Western Canada.			
Maple Leaf Refineries	Coutts	Coutts	5,000	Gasoline, kerosene and fuel oils	Skimming plant
North Star Oil, Ltd.	Winnipeg	St. Boniface	5,000	Gasoline, kerosene and fuel oil	Skimming plant
Northwest Stellarene Co., Inc.	Shelby, Mont.	Coutts	1,500	Gasoline, kerosene and fuel oil	New cracking plant

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
Regal Oil Co.	Calgary	Calgary	3,000	Gasoline, kerosene and fuel oil	Skimming plant
Seaboard Oil Refining, Ltd.	Vancouver	Vancouver	4,000	Gasolin , kerosene and fuel oil	Skimming plant
Sun Oil Co.	Philadelphia	Building refineries in Nova Scotia		.....	.....
Union Oil Co. of Canada	Los Angeles	Port Moody	1,500	.....	Skimming plant shut down
CANARY ISLANDS					
Compania Espanola de Petroles	Santa Cruz de T nerife	Santa Cruz de Tenerife	....	.....	Building
COLOMBIA					
Tropical Oil Co. (International Pet. Co., Canada)	Cartagena	Barranca Bermeja	5,800	Gasoline, kerosene, fuel and lub. oils	Quite modern skimming and topping plant
CUBA					
Standard Oil Co. of Cuba	Havana	Beiolt	5,000	Complete line	.....
CZECHOSLOVAKIA					
"Apollo" Mineralolindustrie (Credit General des Petroles, Paris)	Bratislava	Bratislava	800	.....	.....
David Fanto & Co.	Pardubice	Pardubice	2,000	.....	.....
David Fanto & Co. (Vesta)	Pardubice	Trstena	250	.....	.....
Anton Himmelbauer & Co.	Moravska Ostrava, Moravia	Moravska Ostrava, Moravia	500	.....	.....
"Karpathia" Petroleumraffinerie AG	Mukacevo, sub-Carpathian, Ruthenia	Mukacevo, sub-Carpathian Ruthenia	100	.....	.....
Kralupska Rafinerie Mineralnich Oleju	Prague	Kralupy	750	Complete line	Old equipment with no cracking units
Mineralolraffinerie Mahrisch Schonberg G m b H (Credit General des Petroles, Paris)	Weikersdorf bei Sumperk, Moravia	Weikersdorf bei Sumperk, Moravia	500	.....	.....
"Odra" Mineralolindustrie AG	Bohumin, Silesia	Bohumin, Silesia	1,200	.....	.....
Privozer Mineralolwerka G m b H.	Privoz, Moravia	Privoz, Moravia	750	.....	.....
Vacuum Oil Co. A Sp.	Prague	Kolin, Bohemia	1,200	.....	Atmospheric distillation plant
Weinberger & Ortner	Legina Michalany	Legina Michalany	60	Semi-refined products	Old
ECUADOR					
Anglo Ecuadorian Oilfields (Ltd.)	London	La Libertad	150	Gasoline, kerosene and fuel oil	Modern

A refinery paradise—the Ioco, British Columbia, plant of the Imperial Oil Limited.

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
Ecuador Oilfields (Ltd.)	London	Cautivo	60	Gasoline, kerosene, fuel and lub. oils, etc.	.....
Senora Micaelena de Lecaro Rubira	Carolina	Carolina	40	.....	Old
EGYPT					
Anglo-Egyptian Oilfields, Ltd. (Anglo-Saxon Pet. Co., Ltd.)	London	Suez	8,000	Complete line	Modern with cracking equipment
Raffinerie de Petrole du Government	Suez	Suez	500	Complete line	No cracking equipment
ENGLAND (See under United Kingdom)					
FRANCE					
Brest Port Petrolier, S. A.	Paris	Planning refineries with Ste. Marc sub. of S. A. E. M. Pechelbronn on the road from Paris to Brest, likely to be topping plants equipped with cracking units.			
Cie Francaise de Raffinage	Paris	Large refinery to be built at Gonfreville in Normandy with cracking units.			
Cie Francaise de Raffinage	Paris	Smaller refinery to be built at Martigues on Etang de Berre with cracking units.			
Cie Industrielle des Petroles	Paris	Old refinery at Frontigan near Sete to be rebuilt, old equipment to be scrapped. Will be able to handle about 2100 bbls. of crude per day and will manufacture all products.			
Franco-Americaine de Raffinage (Standard Oil Co. (N. J.)	Paris	A refinery will be built with cracking equipment at Port Jerome on the bank of Seine between Havre and Rouen.			
Les Consommateurs de Petrole	Paris	The smallest refinery will be built at Donges for shareholders only, five railway companies, five steamship companies and four industrial combines.			
Pechelbronn, S. A.	Strasbourg	Merkwiller-Pechelbronn (Bas-Rhin)	2,000	Complete line	2 topping plants with cracking equipment
Petrofina Francaise	Paris	Refinery nearing completion at Port of Dunkerque. Probably be completed in 1932, will have 8,000 bbls. daily capacity topping plant with cracking units and will manufacture complete line of products.			
Produits Chimiques et Raffinerie des Berre	Paris	Etang de Berre	7,000	Complete line	New skimming plant just completed with cracking equipment
Raffinerie de Petrole de la Gironde		Refinery nearly completed at Bec d'Ambes near Bordeaux, with cracking equipment.			
Soc. des Petroles Jupiter (Royal Dutch)	Paris	La Petite Couronne near Rouen	7,500	Complete line	New plant
Soc. des Petroles Jupiter (Royal Dutch)	Paris	Planning refinery at Pauillac with cracking units.			
Soc. Generale des Huiles de Petrole (Anglo-Persian Oil Co.)	Paris	Courchelettes	5,000	Complete line	Rebuilt in 1922
Soc. Generale des Huiles de Petrole (Anglo-Persian Oil Co.)	Paris	Planning Lavera refinery at Port de Bouc on Etang de Caronte n nr Marseilles.			
Vacuum Oil Co. S. A. F.	Paris	Refinery to be built at Port Jerome, chiefly lubricating oils, with cracking units, about 10,000 bbls. daily.			
GERMANY					
Albrecht & Co.	Hamburg	Hamburg	....	Lubricating oils and blends	Lub. oil refinery
Berliner Benzin Werke A. G. (Deutsch Pet. A. G.)	Berlin	Berlin-Lichtenberg	100	Gasoline for industrial use	Gasoline redistill. plant
Deutsch Amerikanische Pet. Ges. (Standard Oil Co., N. J.)	Hamburg	Bremen	....	Lubricating oils	Lub. oil refinery
Deutsch Gasoline A. G. (Owned by Amer. Co., Royal Dutch and German Interests)	Berlin	Emmerich	500	Gasoline, kerosene, gas and lub. oils and asphalt	Distillation and refining plant
Deutsch Gasoline A. G. (Owned by Amer. Co., Royal Dutch and German Interests)	Berlin	Dollbergen	300	Gasoline, kerosene, gas and lub. oils and asphalt	Distillation and refining plant
Deutsch Petroleum A. G.	Berlin	Harburg, Wilhelmsburg	1,000	Gasoline, kerosene, gas and lub. oils and asphalt	Well equipped and one of the best
Deutsch Petroleum A. G.	Berlin	Hanover, Linden	300	Distillate and refined crude oil	.....
Deutsch Petroleum A. G.	Berlin	Rheinau	150	.....	.....
Deutsch Petroleum A. G.	Berlin	Regensburg	500	.....	.....
Deutsch Vacuum Oel A. G.	Hamburg	Bremen	2,000	Lub. oils and greases	High vacuum distillate plant
Deutsch Vacuum Oel A. G.	Hamburg	Wedel, Holstein	....	Lub. oils and greases	High vacuum distillate plant
Ebano Asphalt-Werke A. G.	Hamburg	Harburg, Wilhelmsburg	10,000	Asphalt and gas oil	New distillate plant
Elwerath Gewerkschaft	Hanover	Misburg near Hanover	2,000	Complete line	Being completed with cracking equipment
Mineralol-und Asphaltwerke A. G.	Hamburg	Ostermoor	800	Asphalt, lub. and gas oil	Modern distillate plant
Mineralol-und Asphaltwerke A. G.	Hamburg	Fabrik Offenbach	....	Asphalt	Modern asphalt distillate plant
Mineralolwerk Lichtenberg G m b H	Berlin	Lichtenberg	1,000	Gasoline, kerosene, gas and lub. oils and asphalt	Modern with cracking equipment
Norddeutsche Mineraloel A. G.	Hanover	Salzbergen b. Osnabrueck	200	Gasoline, kerosene, gas and lub. oils and asphalt	Distillate plant
Norddeutsche Mineraloel A. G.	Hanover	Dollbergen	....	Lub. oils and gasoline for industrial uses	Lub. plant and gasoline redistill. plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Monheim		Lubricants	Lub. plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Reisholz (Duesseldorf)		Gasoline for industrial use	Gasoline redistill plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Hamburg-Grasbrook	7,000	Lubricants	Lub. plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Freithal b Dresden		Lubricants	Lub. plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Wilhelmsburg		Gasoline for industrial use	Gasoline redistill plant

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Regensburg	3,000	Gasoline for industrial use	Gasoline redistill. plant
Rhenania-Ossag Mineraloelwerke A. G. (Royal Dutch)	Duesseldorf	Harburg a d Elbe		Asphalt	Asphalt plant
Ernst Schliemann's Oelwerke	Hamburg	Wilhelmsburg	....	Blends	Lub. plant
Oelwerke Julius Schindler G m b H (Pure Oil holds interest)	Hamburg	Neuhof	650	.....	.....
Oelwerke Julius Schindler G m b H (Pure Oil holds interest)	Hamburg	Peine (Hanover)	....	.....	.....
Zeller & Gmelin	Wurtemburg	Wurtemburg	....	Lub. oils and gasoline for industrial use	Lub. and redistill. gasoline plant
HUNGARY					
Budapester Mineralolgabrik A. G	Budapest	Budapest	1,000	Gasoline, kerosene, gas and lub. oils	Skimming plant with old equipment
Hazai Koolajipar R. T.	Budapest	Budapest	1,000	Gasoline, kerosene, gas and lub. oils and asphalt	Skimming and topping plant with old equipment
Magyar Petroleum Ipar R. T.	Budapest	Budapest	1,000	.....	.....
Nyirbogdanyi Pet. Gyar R. T.	Nyirbogdany	Nyirbogdany	100	.....	.....
Shell Koolaj R. T. (Royal Dutch)	Budapest	Csepel Harbor, Budapest	1,700	Gasoline, kerosene, gas and lub. oils	New vacuum distillation plant and other equipment
Ungarische Fanto Werk A. G.	Budapest	Satoraljaujhely	250	Gasoline, kerosene, gas and lub. oils	Skimming plant with old equipment
Vacuum Oil Co.	Budapest	Almas Fuzito	1,200	Gasoline, kerosene, gas and lub. oils	High pressure distillation plant
INDIA					
Assam Oil Co.	London	Digboi	5,000	Complete line	.....
Attock Oil Co.	London	Rawalpindi	1,000	Gasoline, kerosene and fuel oil	.....
British Burma Pet. Co	London	Seikgyi on Rangoon River	2,500	Gasoline, kerosene and fuel oil	Cracking equipment
Burmah Oil Co.	Glasgow	Badarpur	....	.....	.....
Burmah Oil Co.	Glasgow	Syriam on Rangoon River	16,500	Complete line	Cracking equipment
Indo Burma Pet. Co.	Rangoon	Seikgyi on Rangoon River	2,000	Complete line	.....
Indo Burma Pet. Co.	Rangoon	Kindat on Irrawaddy River	1,000	Gasoline, kerosene and fuel oil	.....
Nath Singh Oil Co. (Ltd.)	Yenangyung	Nyaunghla on Irrawaddy River	75	Gasoline, kerosene and lub. oil	.....
United Refineries (Ltd.)	Rangoon	Thilwa	500	Gasoline, kerosene and lub. oils	.....
IRAQ					
Iraq Petroleum Co.	London	Baba Gurgur Area near Kirkuk	1,000	Gasoline, kerosene and fuel oil	.....
Khanaqin Oil Co. (Ltd.)	London	Khanaqin on Alwand River	1,500	Gasoline, kerosene and fuel oil	Quite new
ITALY					
Distillazioni Industriali Combustibili S. A. (Diesa)	Venice	Venice	1,000	Gasoline	New cracking plant
Italo-Americana-Raffineria Triestina S. A. (Standard Oil Co. N. J.)	Trieste	Trieste	1,000	.....	.....
Raffineria Di Olii Minerili (Azienda General Italiana Petroli-Roma)	Fiume	Fiume	1,600	Complete line	Modern skimming plant with cracking equipment
Societa Benzine Italiana (Benit) (Controlled by Petrofina)	Naples	Naples	2,000	Gasoline, kerosene and fuel oil	New cracking plant and atmospheric distillation unit
Societa per la Industria Italiana del Petroleo (Nafta Co. Genoa Shell Group)	Spezia, Liguria	Spezia, Liguria	2,000	Gasoline, kerosene, diesel oil and coke	New cracking plant
Societa Petroli d'Italia	Florenzuela d'Arda	Florenzuela d'Arda	100	.....	.....
Societa Petrolifera Italiana	Fornoro di Taro, Parma	Fornoro di Taro, Parma	50	.....	.....
JAPAN					
Asahi Oil Co.	Tokyo	Tokyo	250	.....	Old
Asahi Oil Co.	Tokyo	Hikoshima, Yamaguchi	250	.....	Old
Japan Gasoline Co.	Higashi-Ku, Osaka	Planning to built refinery with cracking units.			
Kyodo Hanbaijo	Niigata District	Niigata District	2,180	.....	Old
Mitsubishi Oil Co., Ltd. (Associated Oil Co. and Mitsubishi Oil Co.)	Tokyo	Ogimachi, Kawasaki	3,900	Complete line	New skimming and cracking plant
Nippon Oil Co.	Tokyo	Kudamatsu, Yamaguchi	3,500	Gasoline, kerosene and fuel oil	New with cracking equipment
Nippon Oil Co.	Tokyo	Kashiwazaki, Niigata	2,800	Gasoline, kerosene and fuel oil	Old
Nippon Oil Co.	Tokyo	Niigata, Niigata	2,800	Gasoline, kerosene and fuel oil	New with cracking equipment
Nippon Oil Co.	Tokyo	Akita, Akita	3,200	Gasoline, kerosene and fuel oil	Old
Nippon Oil Co.	Tokyo	Tsurumi, Kanagawa	3,500	Gasoline, kerosene and fuel oil	New with cracking equipment
Nippon Oil Co.	Tokyo	Karukawa, Hokkaido	....	.....	Old
Nippon Oil Co.	Tokyo	Ryoritsu, Taiwan	....	.....	Old
Ogura Oil Co.	Tokyo	Tokyo	3,500	Gasoline, kerosene and fuel oil	New with cracking equipment
Ogura Oil Co.	Tokyo	Tsurumi, Kanagawa	1,500	Gasoline, kerosene and fuel oil	Old
LATVIA					
A. Oehlrich & Co.	Riga	Riga	500	Gasoline, kerosene and lub. oils	.....

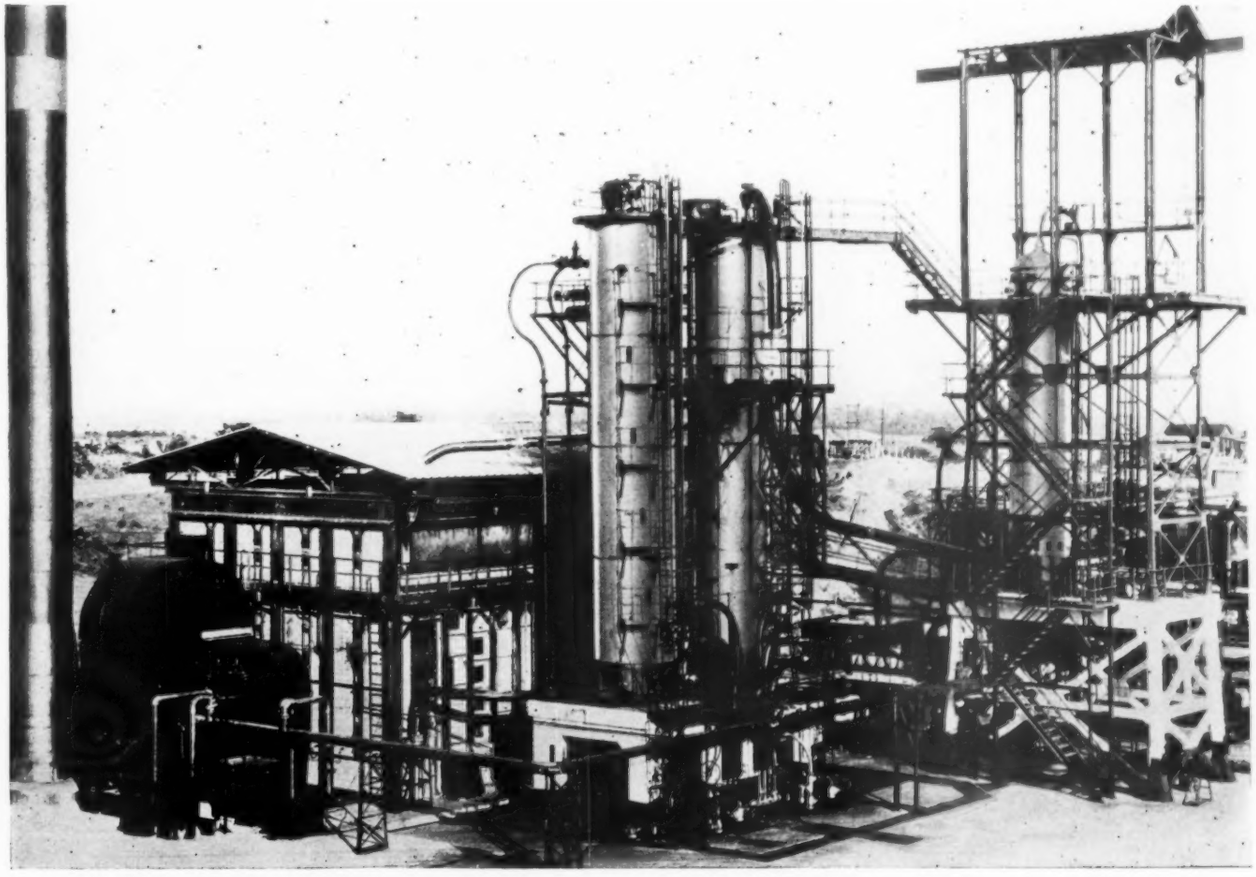
COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
MEXICO					
Cia Mexicana de Petroleo "El Aguila" S A (Royal Dutch)	Mexico City	Minatitlan	20,000	Complete line	Complete plant with cracking equipment
Cia Mexicana de Petroleo "El Aguila" S A (Royal Dutch)	Mexico City	Tampico	90,000	Complete line	Complete plant, including large asphalt plant
Cia Mexicana de Petroleo "El Aguila" S A (Royal Dutch)	Mexico City	Tuxpam	15,000	Complete line	Topping plant
Cia Mexicana de Petroleo "El Aguila" S A (Royal Dutch)	Mexico City	Planning refinery at Mexico City			
Cia Petrolera del Agwi S A	New York	Tecomate	10,000	.....	Topping plant shut down
Cia Petrolera y Refineria Eureka	Small refinery to be built at Tampico—300 bbls. per day.			Petroleum products, asphalt and pet. paint	
Continental Mexican Pet. Co. (General Pet. Corp.)	Los Angeles	Tampico	20,000	.....	Topping plant shut down
Huasteca Pet. Co. (Mexico Pet. Co., which is sub. of Pan American P. & T.)	New York	Tampico	90,000	Complete line	Complete plant
Pierce Petroleum Corp.	St. Louis	Tampico	15,000	.....	Complete plant
Pierce Petroleum Corp.	St. Louis	Vera Cruz	1,500	.....	Complete plant
Transcontinental Oil Co. (Standard Oil Co., N. J.)	New York	Tampico	....	Shut down	
NETHERLANDS					
De Bataafsche Pet. Mij. (Royal Dutch)	The Hague	On River Maas	....	Gasoline and asphalt	.....
NETHERLANDS EAST INDIES					
BORNEO					
De Bataafsche Pet. Mij. (Royal Dutch)	The Hague	Balikpanan	35,000	Complete line	Complete plant with cracking equipment
Sarawak Oilfields, Ltd. (Royal Dutch)	The Hague	Miri	15,000	Gasoline, kerosene and fuel oils	Modern
CERAM					
Dordtsche Pet. Co. (Royal Dutch)	The Hague	Boela Bay	....	.....	Topping plant
JAVA					
Algemeene Pet. Co.	Klantoeng	Klantoeng	100	Kerosene	.....
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Wonokromo	2,000	Gasoline, kerosene and lubricating oils	.....
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Tjepoe	6,000	Gasoline, kerosene, fuel oils and paraffin	Complete plant with cracking equipment
Dutch Colonial Co.	Kapocan	Kapocan near Tjepoe	1,000	.....	.....
SUMATRA					
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Perlak on Cape Peureula	....	.....	Complete plant for distillation and refining of gasoline
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Pangkalan, Brandon	12,000	Gasoline, kerosene and fuel oils	Built in 1892 and enlarged from time to time
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Pladjoe, Palembang	18,000	Gasoline, kerosene and fuel oils	Complete plant
De Bataafsche Pet. Co. (Royal Dutch)	The Hague	Bagoeskoening, Palembang Dist.	18,000	Gasoline, kerosene, lub. oils and greases	Complete plant
Nederlandsche Koloniale Pet. Mij.	The Hague	Soengei-Gerong	13,000	Complete line	New with cracking equipment
NETHERLANDS WEST INDIES					
ARUBA					
Arends Pet. Co. (Royal Dutch)	The Hague	"Bruif" N. W. Point of Island of Aruba	17,500	Complete line	New
Lago Petroleum Corp. (Pan American Pet. & Tr.)	New York	St. Nicholas, Aruba	150,000	Complete line	Complete and modern in every way
CURACAO					
Curacaosche Pet. Ind. Mij. (Royal Dutch)	The Hague	Curacao	250,000	Complete line	New and modern with cracking equipment
NORWAY					
Vallo Oljeraffineri A/S	Oslo	Vallo near Tonsberg	100	Gasoline, kerosene and fuel oil	Modern equipment
PERSIA					
Anglo-Persian Oil Co., Ltd.	London	Abadan	120,000	Complete line	Complete and modern with cracking equipment
Anglo-Persian Oil Co., Ltd.	London	Masjid-i-Sulaiman	....	New topping plant has just been erected	
PERU					
International Pet. Co.	Toronto	Talara	16,000	Complete line	Skimming and cracking plant—old with exception of cracking units
Establecimiento de Petroles Zorritos	Zorritos	Zorritos	1,200	Gasoline, kerosene, gas and fuel oils	Skimming and cracking plant—modern equipment
POLAND					
Jacob Aszkenazy	Drohobycz	Dorhobycz	100	.....	Old and inactive
Dr. Bacher i Spolka Rafinerja Olejow Mineralnych.	Derezyce by Drohobycz	Dereyce by Drohobycz	100	.....	Old and inactive

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
"Bolechow" Zuriazkowa Rafinerja Nafty Zaklady Przemyslowe, Sp.	Doezka by Bolechow	Doezka by Bolechow	100	.....	Old
Boryslowska Spolka Akcyjna Przetworow Oleju Skalnego	Boryslaw	Boryslaw	100	.....	Old
Derezcka Rafinerja Olejow Mineralnych i Fabryka Produktow Chemicznych spolka z ogr. odp.	Derezyce by Drohobycz	Derezyce by Drohobycz	150	.....	Old
"Eka" Rafinerja diejow Mineralnych Spolka z Ogr. Odp.	Grabowiec by Stryj	Grabowiec by Stryj	125	.....	Old
Samuel Ehrenberg & Holender	Gorlice	Gorlice	100	.....	Old and inactive
Fabryka Nafty Walerjan Stawiarski i Ska Spolka z ogr. odp.	Krosno	Krosno	750	.....	Old
J. S. Friedian	Kolomja	Kolomja	100	.....	Old and inactive
Galicyjskie Karpackie Naftowe Towarzystwo Akcyjna, dawn, Bergheim & McGarvey (Credit General des Petroles, Paris)	Lwow	Glinik Marjampolski	1,500	.....	Old with cracking equipment
Galicyjskie Karpackie Naftowe Towarzystwo Akcyjna, dawn, Bergheim & McGarvey (Credit General des Petroles, Paris)	Lwow	Dziedzice	1,200	.....	Old and inactive
Galicyjskie Karpackie Naftowe Towarzystwo Akcyjna, dawn, Bergheim & McGarvey (Credit General des Petroles, Paris)	Lwow	Jedlice	1,200	.....	Old
Galicyjskie Towarzystwo Naftowe "Galicya" S A (Compagnie Franco-Polonaise des Petroles, Paris)	Lwow	Drohobyze	2,000	.....	Old with cracking equipment
"Gozolina" S A	Hrubicze by Drohobycz	Hrubicze by Drohobycz	100	.....	Old
Hubicka Rafinerja Nafty Kornhaber Erdheim, Mendelsohn, Gottesman	Hrubicze by Drohobycz	Hrubicze by Drohobycz	100	.....	Old
"Jaslo" Zuklady Przemyslowo Naftowe (Gartengerg & Schreir, S A)	Nieglowice by Jaslo	Nieglowice by Jaslo	1,500	.....	Old
Krajowa Rafinerja Nafty i Fabryka Wytworow Chemicznych "Frymeta" Sp.	Drohobycz	Drohobycz	100	.....	Old and inactive
J. P. Madejski	Glorice	Glorice	100	.....	Old and inactive
Malopolski Przemysl Olejow Mineralnych, Sp.	Lisko by Sanok	Lisko by Sanok	100	.....	Old
Malopolskie Towarzystwo dla Przemyslu Naftowego "Kleczany" Sp.	Kleczany	Kleczany	100	.....	Old
Modrycka Rafinerja Olejow Mineralnych Gartenberg (Zucker & Ska)	Modrycycz by Drohobycz	Modrycycz by Drohobycz	100	.....	Old and inactive
"Naftamin" Spolka Akcyjna dla Przemyslu Naftowego	Katowice-Ligota	Katowice-Ligota	500	.....	Modern skimming and cracking plant
Pierwsza Stanislawowska Fabryka Jafty Oleju Maszynowego i Benzyng Eisiga Chaim Griffin	.....	Mykietynce by Stanislawow	175	.....	Old
Polski Przemysl Naftowy S A	.....	Raniowce by Drohobyc	100	.....	Old and inactive
"Polska Nafta" S A	.....	Kolomyja	100	.....	Old and inactive
"Polmin" Pansywowa Fabryka Olejow Mineralnych	Lwow	Drohobycz	6,000	.....	Old
Polskie Zwiazkowe Rafinerje Olejow Skalnych S A	.....	Trezebinia	1,500	.....	Old with cracking equipment
Polskie Zwiazkowe Rafinerje Olejow Skalnych S A	.....	Drohobycz	800	.....	Old with cracking equipment
Rafinerja Nafty i Fabryka Olejow Maszynowych, Beia Haber, Sp.	.....	Stanislawow	150	.....	Old
Rafinerja Nafty i Fabryka Olejow Maszynowych, Beia Haber, Sp.	.....	Stryj	150	.....	Old and inactive
Rafinerja Nafty "Iwonicz" Sp.	.....	Targowiska	100	.....	Old
Rafinerja Nafty "Gleboka" Sp.	.....	Gleboka by Sambor	100	.....	Old and inactive
Rafinerja Nafty i Olejow Mineralnych Lam i Sp.	.....	Krechowice by Stanislawow	100	.....	Old
Rafinerja Olejow Mineralnych Inz Dr. Baltuch, Leiberman i Marmelstein	.....	Borysław	100	.....	Old
Rafinerja Olejow Mineralnych "Segil" Sp.	.....	Nadworna	150	.....	Old
Rafinerja Skawinska Zaklady dla Przemy-Oleju Skaenego, Griffel S Ska	.....	Skawina	175	.....	Quite modern
Rafinerja "Wierbiarz" ad Kolomyja Fabryka Przetworow Olejow Skalnych	.....	Wierbiarz by Kolomyja	100	.....	Old
Dr. M. Rapaport	.....	Hrubicze	100	.....	Old and inactive
"Spogan" (Former Kreppel)	.....	Drohobycz	100	.....	Old and inactive
Spolka Akcyjna "Fanto" (Credit General des Petroles, Paris)	Lwow	Ustrozyki Dolne	1,000	.....	Old with cracking equipment
Spolka Akcyjna "Nafta" (Cerdit General des Petroles, Paris)	Lwow	Drohobycz	1,200	.....	Quite new
Spolka Skcyjna dla Przemyslu Naftowega i Gazow Ziemnych	.....	Zniesienie by Lwow	300	.....	Quite new
Spolka Akcyjna "Kaukaz"	.....	Stroze	100	.....	Old and inactive
Standard-Nobel w Polsce S A (Standard Oil Co., N. J.)	Warsaw	Libusza by Gorlice	1,200	.....	Quite modern
Towarzystwo Naftowe "Limanowa"	Borysław	Limanowa	2,000	Gasoline, kerosene, gas and fuel oil	Old with cracking equipment
S. Tumidajski	.....	Glorice	100	.....	Old and inactive
Vacuum Oil Co. S A	.....	Dziedzice	1,500	Lub. stocks and pressed wax distillate	Old with modern cracking equipment
Zahcariasz Handel	.....	Drohobycz	100	.....	Skimming — old equipment

ROUMANIA

Astra Romana, S. A. (Royal Dutch)	Bucarest	Ploesti	40,000	Complete line	Cracking equipment
I. Berman	.....	Bucovat-Chisinau	50	Gasoline, kerosene, gas and fuel oil	.....
H. I. Bernstein	.....	Moinesti	30	Gasoline, kerosene, gas and fuel oil	.....
Bitumul Matitza	.....	Matita	10	Gasoline, kerosene, gas and fuel oil	.....
H. Blum	.....	Marjineni	75	Gasoline, kerosene, gas and fuel oil	.....
"Carmen-Petroleum," S. A.	Bucarest	Targoviste	2,000	Gasoline, kerosene, gas and fuel oil	.....
"Colombia" Soc. Franco Roumaine de Petrole	Bucarest	Ploesti	15,000	Gasoline, white spirit, kerosene, gas and fuel oil	Mostly old equipment with exception cracking

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
"Colombia" Soc. Franco Roumanie de Petrole	Bucarest	Cerna-Voda	....	Not running, very old—it has cracking equipment	
Cometa, S. A	Bucarest	Ploesti	2,000	Gasoline, kerosene, gas and fuel oil	.....
Coroana, S. A.	.....	Mizil	150	Gasoline, kerosene, gas and fuel oil	.....
Credit Minier, S. A.	Bucarest	(Aurora) Baicoi	15,000	Gasoline, kerosene, gas and fuel oil	.....
Credit Minier, S. A.	Bucarest	(Fratzia) Ploesti	750	Gasoline, kerosene, gas and fuel oil	.....
Credit Minier, S. A.	Bucarest	Tileagd	400	Gasoline, kerosene, gas and fuel oil, white spirit and lub. oil	.....
Credit Minier, S. A.	Bucarest	Orsova	500	Gasoline, kerosene, gas and fuel oil, white spirit and lub. oil	.....
Dacia Romano Pet. Synd. Ltd	London	Ploesti	3,500	Gasoline, kerosene, gas and fuel oil	Old equipment
"Fratia" M. Solomon	.....	Ploesti	400	Gasoline, kerosene, gas and fuel oil	.....
"Fratii" Freund	.....	Satu-Mare	75	Gasoline, kerosene, gas and fuel oil	.....
Fratii Niculescu Ciufu	.....	Targoviste	200	Gasoline, kerosene, gas and fuel oil	.....
I. Grigorescu, S. A.	.....	Targoviste	1,000	Gasoline, kerosene, gas and fuel oil	Skimming plant fairly modern
C. Haimsohn	.....	Buhusi	30	Gasoline, kerosene, gas and fuel oil	.....
M. Haimsohn	.....	Moinesti	50	Gasoline, kerosene, gas and fuel oil	.....
Helios	Targoviste	Targoviste	150	Gasoline, kerosene, gas and fuel oil	.....
Industria de Petrol Fridman	.....	Dej	300	Gasoline, kerosene, gas and fuel oil, white spirit and lub. oil	.....
Alik Leibu	.....	Moinesti	30	Gasoline, kerosene, gas and fuel oil	.....
Leon A. Leibu	.....	Adjud	50	Gasoline, kerosene, gas and fuel oil	.....
Luciana	.....	Ploesti	750	Gasoline, kerosene, gas and fuel oil	.....



Cracking plant in modern Mexican refinery, which operates at high efficiency.

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
Moldonaphta Co. (Danube Oil Trading Co. of Roumania, Bucarest)	.....	Moinesti	400	Gasoline, kerosene, gas and fuel oil	.....
N. V. Clocardel	.....	Matita	100	Gasoline, kerosene, gas and fuel oil	.....
"Noris," S. A.	Ploesti	Ploesti	700	Gasoline, kerosene, gas and fuel oil	No cracking
"Orion," S. A. (Phoenix Oil & Trans. Co.)	Bucarest	Ploesti	15,000	Gasoline, kerosene, gas and fuel oil, white spirit and lub. oils	.....
"Pallas," S. A.	Bucarest	Galati	200	Gasoline, kerosene, gas and fuel oil, and white spirit	.....
Petrol Block S. A.	Bucarest	(Standard) Ploesti	7,000	Gasoline, kerosene, gas and fuel oil	.....
Petrol Block S. A.	Bucarest	(Saturn) Buzau	500	Gasoline, kerosene, gas and fuel oil	.....
Petrol Block S. A.	Bucarest	(Baneasa) Bucarest	500	Gasoline, kerosene, gas and fuel oil	.....
Petrol Latina, S. A.	Bucarest	Plopeni	500	Gasoline, kerosene, gas and fuel oil	.....
Petrolmina, S. A.	.....	Ploesti	1,500	Gasoline, kerosene, gas and fuel oil, and white spirit	.....
Petrolul Bucovinean	.....	Rohozna-Cernauti	150	Gasoline, kerosene, gas and fuel oil	.....
Perolul Bucuresti	.....	Bucarest	3,000	Gasoline, kerosene, gas and fuel oil	New equipment
Petrolul Buzau, S. A.	.....	Buzau	100	Gasoline, kerosene, gas and fuel oil	.....
"Photogen" Nederlandsche Pet. Mij.	Amsterdam	Brasov	700	Gasoline, kerosene, gas and fuel oil, white spirit and lub. oils	.....
Rad. de Petrol din	.....	Tg. Mures	30	Gasoline, kerosene, gas and fuel oil	.....
"Redeventa," S. A.	Bucarest	Ploesti	3,000	Gasoline, kerosene, gas and fuel oil, and white spirit	.....
Romana-Africana S. A. (Service Pet. Co., Ltd.)	Bucarest	(Xenia) Ploesti	5,000	Gasoline, kerosene, white spirit, gas and fuel oil	Old
Romano-Americana S. A. (Standard Oil Co. N. J.)	Bucarest	Teleajen	15,000	Gasoline, white spirit, kerosene, gas and fuel oil and lub. oils	Old equipment with cracking unit
B. Scheffler	.....	Moinesti	30	Gasoline, kerosene, gas and fuel oil	.....
Alter Schwartz	Moinesti	Lucaciesti	50	Gasoline, kerosene and fuel oil	Old
Nathan Silberman	.....	Moinesti	10	Gasoline, kerosene, gas and fuel oil	.....
Dr. Smarack	.....	Roznov	150	Gasoline, kerosene, gas and fuel oil	.....
Soc. Romano-Belge de Petrole	Bucarest	(Venus) Rammicul-Sarat	1,000	Gasoline, kerosene, paraffin, asphalt, gas and fuel oil	.....
Steaua Romana, S. A.	Bucarest	Campina	30,000	Gasoline, kerosene, gas and fuel oil, white spirit, lub. oils	Skimming plant with cracking equipment — only part of equipment new
Steaua Romana, S. A.	Bucarest	Moinesti	700	Skimming plant quite modern, destroyed by fire this year	
Heinrich Steinberg	.....	Brasov	200	Gasoline, kerosene, gas and fuel oil	.....
Titan-Petrol	.....	Bucarest	1,000	Gasoline, kerosene, gas and fuel oil	.....
"Unirea," S. A. (Phoenix Oil & Trans. Co.)	Bucarest	Ploesti	8,000	Gasoline, kerosene, gas and fuel oil	Old
Uranos (I. Mandel)	.....	Ploesti	150	Gasoline, kerosene, gas and fuel oil	.....
"Vega," S. A.	Bucarest	Ploesti	20,000	Gasoline, kerosene, fuel and lub. oils	Topping plant with some equipment modern
Victoria (Petrolifera)	.....	Targoviste	75	Gasoline, kerosene, gas and fuel oil	.....
RUSSIA					
Azneft	Baku	21 plants at Baku	168,000	Complete line	Old with cracking equipment
Asneft	Baku	8 plants at Baku	40,000	Complete line	Built in 1930
Asneft	Baku	2 plants at Batum	6,000	Complete line	Old with cracking equipment
Grozneft	Grozni	9 plants at Grozni	100,000	Complete line	Old with cracking equipment
Grozneft	Grozni	2 plants at Grozni	19,000	Complete line	New topping plants built in 1930
Grozneft	Grozni	1 plant at Tonapse	6,500	Complete line	Old
Neftisavodi	Guryev	1 plant at Leningrad	300	Complete line	Old and part new
Neftisavodi	Guryev	1 plant at Krasnodar	3,000	Complete line	Old
Neftisavodi	Guryev	1 plant at Konstantinovska	5,500	Complete line	Old
Neftisavodi	Guryev	1 plant at Varinsk	3,000	Complete line	Old
Neftisavodi	Guryev	2 plants at Uzbek Republic	400	Gasoline, kerosene and fuel oil	Old
(For plants under construction, and proposed, see page 436)					
SCOTLAND (See under United Kingdom)					
SPAIN					
Campa (Spanish Monopoly)	Madrid	Cornello	....	.....	Small old plant still operating
Campa (Spanish Monopoly)	Madrid	Barcelona	10,500	Building and plans for three more are under consideration	

COMPANY	HEAD OFFICE	PLANT LOCATION	DAILY CAP. (BBL.)	PRODUCTS	EQUIPMENT
SWEDEN					
Axel, Johnson & Co.	Stockholm	Nynasham	500	Gasoline, kerosene, fuel oil and asphalt	With cracking equipment
TRINIDAD					
Trinidad Central Oilfields, Ltd.	London	Tabaquite	500	Complete line	Modern equipment
Trinidad Lake Asphalt Co., Ltd. (General Asphalt Co.)	Philadelphia	Brighton	....	Gasoline for own use, road oil and binder for sale locally	Small topping plant
Trinidad Leaseholds, Ltd.	London	Pointe-a-Pierre	28,000	Complete line	Modern plant with cracking equipment
United British Refineries, Ltd. (Anglo-Saxon Pet. Co., Ltd.)	London	Point Fortin	5,000	Complete line	Modern complete plant
West India Oil Co.	New York	Point d'Or	1,000	Complete line	Skimming plant with modern equipment
UNITED KINGDOM					
Anglo-Persian Oil Co., Ltd.	London	Llandarcy, near Swansea Wales	40,000	Complete line	New equipment, including cracking
Agwi Petroleum Corp. (Standard Oil Co., N. J.)	London	Fawley, near Southampton, England	10,000	Complete line	Topping plant, including cracking, equipment—new
Cory Bros. & Co., Ltd.	London	Coryton	6,600	Gasoline and fuel oil	Modern with cracking equipment
London & Thames Haven Oil Wharves, Ltd.	London	Thames River, near London	17,000	Gasoline, kerosene and fuel oil	Three modern plants
Major & Co., Ltd.	London	Hull	....	Used for distilling intermediate products	.....
Medway Oil & Storage Co., Ltd.	London	Isle of Grain, Kent, England	....	Gasoline, fuel oil and special products	Modern with cracking equipment
Petroleum Refineries, Ltd.	London	Killingholme, near Hull, Yorkshire	4,000	.....	New cracking plant
Shell Mex. Ltd. (Asiatic Pet. Co., Shell Group)	London	Shell Haven, near London	7,000	White spirit, lub. diesel and fuel oils and asphalt	Old
Shell Mex. Ltd. (Asiatic Pet. Co., Shell Group)	London	Stanlow (Ellsmere Port) Manchester Ship Canal	4,000	Gasoline, white spirit, etc., diesel and fuel oil and asphalt	Modern
Shell Mex. Ltd. (Asiatic Pet. Co., Shell Group)	London	Ardrossan, Ayrshire, Scotland	2,000	Blending and asphalt	Modern
Scottish Oils, Ltd. (Anglo-Persian Oil Co., Ltd.)	Glasgow	Grangemouth, near Edinburgh, Scotland	20,000	Complete line	Modern
Scottish Oils, Ltd. (Anglo-Persian Oil Co., Ltd.)	Glasgow	Uphall, near Edinburgh, Scotland	2,500	Complete line	Modern
VENEZUELA					
Caribbean Pet. Co. (Royal Dutch)	Maracaibo	San Lorenzo	20,000	Gasoline, kerosene, gas and fuel oils	Skimming and cracking plant — modern equipment
Compania Anonima Petrolea del Tachira	San Cristobal	Santa Ana Tachira	....	.....	.....
Lago Petroleum Corp. (Pan Amer. Pet. & Trans.)	New York	Salinas	4,500	Gasoline, kerosene, gas and fuel oils	New topping plant
Venezuela Gulf Oil Co.	Pittsburgh, Pa.	Cabimas	1,500	.....	New topping plant
West India Oil Co.	New York	Maracaibo	2,000	Gasoline	.....
WALES (see under United Kingdom)					
YUGOSLAVIA					
Anglo-Yugoslavenski Petrolejsko D D (Royal Dutch)	Zagreb	Caprag on the Kupa River	1,400	.. ..	.....
Dravogradska Rafinerija Mineralnega Olja	Dravograd	Dravograd	150	.....	.....
Standard Oil Co. of Yugoslavia (Standard Oil Co., N. J.)	Zagreb	Bosanki Brod	2,000	Complete line	Partly remodelled

Aruba refinery; power house on right, re-run units in center and cracking units in distance. The employees' settlement lies beyond the cracking plant

International News and Reports

COSTA RICA has made the importation and sale of gasoline a State monopoly under a law that became effective on June 12, 1931.

▼

In the first four months of 1931 a total of 6,802,500 bbl. of crude oil and petroleum products were imported into France. French tankers carried 2,328,500 bbl.

▼

Under a new Nicaraguan law, a government monopoly on the sales of all petroleum products within the country has been created. This means that the West India Oil Company, the Caribbean marketing subsidiary of the New Jersey Standard, may be ousted from Nicaragua, where it has been operating for more than 15 years.

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The Peruvian operating subsidiary of Lobitos Oilfields, Ltd., is now producing casinghead gasoline at the rate of 100,000 bbl. per annum, treating 1,974,000,000 feet of gas, part of which is used for repressuring and as fuel. The gasoline produced is piped to the Talara refinery of the International Petroleum Company. Last year the South American Gulf Oil Corporation purchased the company's remaining concessions in Colombia, together with equipment on the property, but the legal transfer only took place last May.

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A complete story of how the world's deepest well was drilled below 10,000 feet is told fully in the June issue of our companion journal, PETROLEUM WORLD, published in our Los Angeles, Cal., office.

Copies of PETROLEUM WORLD can be obtained from the New York office of WORLD PETROLEUM; price 35c, including postage to anywhere in the world.

The well is Hobson A-2 in the Rincon field drilled by Chanslor Canfield Midway Oil Company reaching 10,030 feet on May 2.

The well was spudded in on August 16, 1929. The size of the hole from grass roots to 800 feet is 25 inches. From this point to 4,350 feet the hole is 17¼ inches; thence to 6,645 feet a 10⅝ inch bit was used. From this point to the bottom of the hole, the diameter is 4¾ inches. At the deeper levels pressures are 4,000 pounds.

The J. P. Devine Manufacturing Company, Inc., advise us that patent 1810547 covering the method of manufacturing high compression automotive distillate has been awarded to Clinton John Pratt. The patent has been assigned to the Automotive Distillate Corporation of Independence, Kansas.

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Just how far the Pan-American Petroleum and Transport Company will go with the Gulf Oil Corporation, the Royal Dutch-Shell group and the Standard Oil Company of New Jersey, in continuing the gentlemen's agreement to restrict petroleum imports from the Caribbean, which expires July 15, is not known at this time. The outcome partly depends on the success of production restriction in the East Texas field, where uncontrolled out put is one of the factors preventing stabilization of the oil industry. The Pan-American Petroleum and Transport Company has an extensive sales output for fuel oil and gasoline on the east coast of the United States, and its small refinery in Louisiana is not capable of handling its requirements. So far as can be ascertained the curtailment plans will carry along automatically and smoothly, unless any unanticipated conditions arise to disturb the arrangement.

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Iraq Petroleum Company, although not yet producing oil commercially, except to a moderate extent, is paying the Iraq Government $2,000,000 per annum. The first payment was made on May 30, 1931, and in addition the company to date has spent $20,000,000 in development work, and is about to start a $50,000,000 pipe line. By the time crude flows to the Mediterranean, the company will have expended nearly $100,000,000.

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The holdings in the Near East Development Corporation, which is the American company participating to the extent of 23¾ percent in the Iraq Petroleum Company of the Pan American Petroleum and Transport Company has been sold to the Standard Oil Company of New Jersey. There also is a rumor that the Atlantic Refining Company may sell its interest to the Jersey or New York Standard. As the American participation now stands, the New Jersey Standard holds 41-2/3 percent, New York Standard 25 percent, Gulf Oil Corporation 16-2/3 percent, Atlantic Refining Company 16-2/3 percent.

World Oil Production Figures—Official

All figures furnished direct to World Petroleum by Governments, except where otherwise specified

(Conversion 7 bbl. = 1 ton)

Country	Total Production 1930 (revised) (Barrels)	JANUARY (Barrels)	FEBRUARY (Barrels)	MARCH (Barrels)	APRIL (Barrels)	MAY (Barrels)
United States	896,265,000	65,991,000	60,645,000	69,397,000	73,101,000	77,164,000
Venezuela	141,652,832	10,579,707	9,806,034	10,705,814	9,597,784	9,834,545
Russia & Sakhalin	129,955,417	12,072,900	11,141,900	12,654,600	12,318,600	12,796,000
Persia	43,549,323[6]	3,201,156[6]	3,079,132[3]	3,081,260[6]	3,442,341[6]	4,296,642[6]
Roumania	39,876,589	4,233,810	3,570,000	3,856,020	3,850,000	4,195,100
Mexico	39,529,639	2,890,903	2,563,986	2,819,430[3]	2,761,039	3,008,603
Dutch East Indies	38,722,250	3,226,854	3,225,000	3,200,000[5]	3,000,000[5]	3,000,000[5]
Colombia	20,343,176	1,657,694	1,565,425	1,774,865	1,467,429	1,479,452
Peru	12,445,888	986,902	662,022	1,131,155	914,342	762,624
Trinidad	9,419,804	821,523	744,518	844,534	798,134	788,028
Argentina	9,001,671	898,007	796,578	740,000[5]	800,000[5]	1,038,780
India (British)	6,936,315	662,604	635,743	703,568	575,000[5]	575,000[5]
Sarawak	5,251,541	326,956[1]	231,090	314,937[3]	309,876	302,295
Poland	4,645,550	390,600	350,700	381,500	357,000	372,155
Japan & Taiwan	2,250,000[5]	197,500[5]	195,000[5]	195,000[5]	195,000[5]	195,000[5]
Egypt	1,977,660	196,021[1]	158,210	162,225	160,573	152,418
Ecuador	1,596,238	137,531	120,145	126,544	117,763	169,111
Canada	1,535,827	179,711	155,651	160,358	153,705	156,392
Germany	1,209,185	127,894	98,000	100,030	77,833	93,438
Iraq	980,000[8]	100,000[5]	100,000[5]	100,000[5]	100,000[5]	100,000[5]
France	516,642	40,075[2]	40,075[2]	40,075[5]	40,000[5]	40,000[5]
Czecho-Slovakia and Others	220,000[5]	25,900[5]	25,900[5]	25,900[5]	29,000[5]	29,000[5]
	1,407,880,547	108,945,248	99,910,109	112,514,815	114,166,424	120,550,383

[1] 4 weeks to February 6th.
[2] Official total, 1st quarter 120,225.
[3] 4 weeks to April 17th.
[4] International Petroleum Co. production was 720,810 bbl. for April and 757,950 bbl. for May.
[5] Estimates.
[6] Anglo-Persian Company's figures.
[8] Actual production in Iraq probably higher than official total.

The Foreign Oil Legion

F. G. RAPPAPORT, general manager for the British Controlled Oilfields, Ltd., in Venezuela was a passenger on the Curacao-LaGuaira plane enroute to Caracas on company business.

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JAMES DOUGLAS, general manager of the Union National Petroleum Co., operating in the Maracaibo Lake basin returned by Pan American Airways plane to his headquarters after a short inspection of operations in Eastern Venezuela.

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SYDNEY OTEY, superintendent of Venezuela Gulf Oil Company refinery at the Cabimas field, returned June 9th aboard Red "D" line boat TACHERIA from a vacation spent in Port Arthur, Texas, Hot Springs, Ark., and New York. He was accompanied by Mrs. Otey who is making her first trip to South America.

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HAROLD FRY, assistant general manager of the Creole Petroleum Corporation left Maracaibo by plane for Maturin, Venezuela and thence to the States.

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CAPTAIN WILLIAM CLARK, marine agent, Venezuela Gulf Oil Company, left by tanker for the peninsula of Paraguana, the reloading station of the company, on his tour of inspection following his regular visit to the docks at the Cabimas and Lagunillas fields.

▼

H. M. MACINTYRE, of the Anglo-Persian staff at Ahwaz, has been transferred for service at Abadan.

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J. KEWLEY, chief chemist of the Asiatic Petroleum Company, has been elected president of the Institution of Petroleum Technologists, England, in succession to Dr. Dunstan, late of the Fuel Research Board.

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J. A. ASSHETON, president, Mexican Eagle Oil Company Ltd. has been visiting New York.

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G. R. NUTTY, president, Gulf Refining Company, has returned to Pittsburgh, Pa. following a visit to Great Britain.

GEORGE B. GARRETT, sales engineer, Arthur G. McKee & Co. recently sailed for England where he will remain for some months representing his company. The McKee Company recently formed an association with the Whessoe Foundry & Engineering Co., Ltd., Darlington, England.

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J. C. TAYLOR, of the Burmah-Shell Oil Storage and Distributing Company of India, has returned to England on leave from the Ambala Division.

▼

DR. E. JAMIESON, Chief Medical Officer of the Anglo-Persian Oil Company in Persia, recently paid a visit to the company's Head Office, London, England.

W. GIVENS, manager, Venezula Sun Company, Caracas, recently arrived in Maracaibo on the Pan American Airways plane to make an inspection.

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J. A. CLARK, field superintendent at La Salina for the Lago Petroleum company left Maracaibo for consultation with a New York specialist. In his absence Arthur Proudfoot of the Lagunillas camp is in charge, leaving Delbert Lewis to fill the vacancy at Lagunillas.

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CESAR POPESCUE, director of the Ministry of Industry and Commerce, has received an appointment to act as general secretary of that Rumanian Ministry.

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HAROLD F. MOSES, local manager at Maracaibo, Venezuela, for the Paraguana Petroleum Corporation recently arrived in New York via Baranquilla and Miami, whence he flew by airplane.

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CHESTER M. CREBBS, general agent of the Venezuela Gulf Oil Company leaves Maracaibo the first week in July for his regular vacation to be spent in the United States. During his absence, Hoyt Sherman will assume the duties.

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Gulf's New Barco Contract

FOLLOWING passage of the terms of the new Barco concession contract by the Colombian Congress, it was signed by President Enrique Olaya Herrera, and will become law by publication in the official journal. The principal terms of the contract under which the South American Gulf Oil Corporation may operate are as follow:

The life of the contract will be fifty years from the date it becomes effective, and it may be transferred only by authority of the Colombian Government. Within the boundaries outlined in the contract, the concessionaire will select one or more areas of at least 125,000 acres for exploitation during the first five years; and during the following five years must select and determine the areas definitely to be exploited, not to exceed a total of 500,000 acres, including the area first selected. The excess area remaining will revert to the Colombian Government.

The concessionaire is obliged to drill wells until it is evident that petroleum does not exist in commercial quantities, or until a total minimum daily production of 21,000 bbl. is attained, at which time it will be obliged to construct a pipe line within Colombian territory, to a point on the Atlantic coast. When the minimum daily production reaches 28,000 bbl. the concessionaire will be obliged to construct a refinery. There is an obligation to pay the Government $25,000 U. S. currency per annum, until the Government's royalty amounts to or exceeds a royalty of 10 percent of gross production obtained in the field, or 6 percent at maritime port, when cash payment is stopped.

At the expiration of the concession, all equipment belonging to the concessionarie on the concession, including refineries, pipe line, etc., etc., will become the property of Colombia, without payment or indemnity. Concessionaire may, however, abandon the concession after drilling first two wells, and remove all equipment therefrom. All equipment necessary for working the concession will be free from taxes and duties of all kinds and petroleum produced will be subject to no tax aside from the income and stamp taxes. The contract may be nullified administratively by the Government for failure by the concessionaries to carry out terms of the contract. (For story of Barco, see page 363, June.)

U. S. Production Review

	Daily Production bbl.	Daily Runs to Stills bbl.	Gasoline Stocks bbl.	Imports for Week Total bbl.	Imports for Week Gasoline bbl.
Week Ending May 23.....	2,439,230 303,762*	2,441,700	45,449,000	1,397,000	328,000
Week Ending May 30.....	2,464,197 350,900*	2,474,600	44,795,000	1,728,000	300,000
Week Ending June 6.....	2,473,773 351,500*	2,418,400	44,225,000	860,000	214,000
Week Ending June 13.....	2,463,100 329,000*	2,461,714	43,410,000	1,927,000	405,000

Underlined figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks or imports.
(*) Production of the Rusk-Gregg field, East Texas.

Exports Decline

IN connection with the greatly weakened crude oil price structure the accompanying statistics are of great importance and may be considered as contributory factors.

Exports of Crude and Refined Products from U. S.

	1930	1931
January....	13,444,000	11,712,000
February...	11,484,000	9,401,000
March.....	14,059,000	8,503,000
April.....	13,987,000	7,879,000
May.....	11,252,000	.....
June.....	16,253,000	.....
1st 4 months	52,965,000	37,495,000

It must be observed that 1930 monthly figures indicate steady exports, while the first four months of 1931 show a decline of 29 percent in the total export figures over the corresponding period of 1930; the first six months will in all probability show a decline of fully 34 percent. Prices of products exported have also shown a steady drop, so the falling off in volume is very substantial.

Also the monthly domestic consumption of motor fuel beginning with February, 1931, started to lag behind the corresponding months of 1930, showing a decline of 1.2 percent for February; of 0.6 percent for March; and of 2.1 percent for April, thus definitely reversing the previously ascending consumption.

Crude Oil Prices

THE complete failure of every proration effort in the Rusk-Gregg field of East Texas inevitably brought about a collapse of crude oil prices in that field, which was necessarily followed by a radical downward revision throughout the Mid-Continent district, and to a minor extent a downward revision in Eastern fields. Production of the Rusk-Gregg field since May 30 averaged above 350,000 bbl. per day, or approximately 200,000 bbl. above the allowable set by the Texas Railroad Commission.

As the reduced prices in East Texas failed to stem the flood, and considerable amounts were being sold under the new schedule, most of the major purchasing companies withdrew entirely as buyers, running their own production only, or informed the sellers and royalty owners, as the Humble Oil and Refining Co. did on June 2 that hereafter it would pay "what we interpret to be the average current selling price," the same letter explaining that the "lack of any generally observed or enforced program for orderly production has created such chaotic conditions that it is impossible to determine in advance what the fair price for crude in this field should be."

It is almost impossible at this writing to estimate the average selling price of crude in Rusk-Gregg field, as the quotations are as low as 10c at the well, or 15c loaded in tank cars, but around 25c at the wells may be considered as either the present average, or the average in the very near future, as the earlier contracts at higher prices expire.

Losses caused by over-production have assumed staggering proportions. Whereas in June and July of 1930 a daily production of 2,500,000 bbl. brought $3,050,000, production of 2,470,000 bbl. in June, 1931, is worth but $910,000, or a decline in value of 70 percent, with the volume of production remaining about same.

While the oil industry is the major sufferer, the local population, as represented by the land and royalty owners, had its income cut from approximately $382,000 per day, to $114,000, such decline being responsible for business stagnation in older producing areas, and for but very small benefits accruing to communities of East Texas, Oklahoma City, and New Mexico.

On June 19 Standard Oil Company of California restored the normal relationship of crude prices in California by quoting high gravity crude above low gravity oil. This increase on the high gravity crude is from 20 cents to 50 cents per barrel. For 36 gravity and above the quotation was 87 cents a barrel or 100 percent increase in price. Standard's action was followed by other leading companies. On the other hand, Magnolia Petroleum Company, subsidiary of the Standard of New York posted flat prices throughout the mid-continent on June 19.

Texas Proration

PRORATION in Rusk-Gregg field, East Texas, as indicated elsewhere in this review has been a complete failure, production ranging 120 percent above the allowable set by the Texas Railroad Commission. Since the original allowable set by the Railroad Commission was but 90,000 bbl., and the current one is 160,000 bbl. it is evident that whenever the Commission increases the allowable, the number of additional completions and additional facilities for handling crude oil increase actual production to such an extent that even a compromise between the Commission and the bolting operators appears impossible. The matter is further aggravated by the necessity for most of the small operators to meet current obligations, and because of lower prices they insist on increasing production to avoid receivership—thus forming a vicious circle.

Because of the apparent ease of securing injunctions against proration orders, the large number of operators desiring to secure such injunctions, the rapid encroachment of salt water in all parts of the field, the short flowing life of wells, the high expense of pumping (above the current market price) and the constant menace to the oil industry if Rusk-Gregg is finally prorated, because of the ever present danger that the proration will be broken down again, it is very

likely to the advantage of the oil industry at large to have the Rusk-Gregg field not prorated, but flooded and exhausted of its natural gas in the briefest possible time, though the waste of non-recoverable oil in such a case will be very large.

California Proration

SENATOR W. R. SHARKEY'S BILL NO. 362 for preservation of California's petroleum through curtailment of wasteful over-production has been passed by the Senate and signed by the Governor. The new law goes into effect August 15. The law provides for the creation of an Oil Conservation Commission consisting of five members, representing five districts, and the State Oil and Gas Supervisor, who is appointed by the Governor and sits as ex-officio secretary. The commission has full powers to order proration, to bring action against violators of its orders and to prevent removal of the over-produced oil from the offending properties.

Meanwhile, operators of California agreed to curtail production to 487,000 bbl. per day, from current 527,000 bbl.

East Texas—Rusk-Gregg

ACCORDING to latest data available the Rusk-Gregg field had on June 15, 800 producing wells and 600 active operations. On that date the total recovery of crude oil reached 25,250,000 bbl. The weekly average of producing completions has been around 90, while new projects average slightly above 100. Salt water encroachment continued to seriously endanger the Central Kilgore Sector, while in the South Joiner Sector of the total of 311 producing wells, 53 were dead, 27 were pumping and 231 were flowing naturally, indicating that over one quarter of the producing wells in that Sector do not pay for the operating expenses at the current selling price of crude oil. It has also been estimated that because of the failure of proration and withdrawal of several buyers (to run their own production exclusively) at least 160 wells in the Rusk-Gregg field failed to secure pipe line connections of any kind and are, therefore, not producing.

BASIL B. ZAVOICO

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U. S. SOVIET RUSSIA PRODUCTION REVIEW

Operations

LATEST figures available are for May, 1931 which are as follows:

Crude Production	12,796,000 bbl.
Runs to Stills	11,841,000 bbl.
Drilling	236,009 feet

(The official figures, which are issued in metric tons, were converted by World Petroleum at the rate of 7 bbl. per ton.)

Totals for the first 5 months of 1931

	Crude Production (Bbl.)	Run to Stills (Bbl.)	Drilling (Ft.)
January	12,072,900	10,399,200	168,458
February	11,141,900	9,514,400	147,935
March	12,654,600	11,197,200	226,439
April	12,318,600	10,569,300	239,699
May	12,796,000	11,841,900	236,009
Total	60,984,000	53,522,000	1,018,540

Production Program

THE very latest figure set for production of crude is 462,000,000 bbl. for the year 1934. This is discussed elsewhere in these notes.

New 5-Year Plan

PREPARATIONS are being made for a new Five-Year Plan for the Soviet oil industry. Its outstanding feature will be the fundamental reorganization of the refining section, and transportation facilities. It is contemplated to locate oil refineries at points of consumption all over the country, while the Caucasian refineries will be limited to supplying the nearest markets, including the left part of the Ukraine for which the new Armavir-Ukraine 10 in. pipe line for refined products will be the main carrier. Otherwise crude oil will be transported by tankers on the Caspian Sea and Volga River to the central regions, where a number of refineries are to be erected within the next two years.

Samara and Stalingrad on the Volga are considered very suitable as locations, and plans are made for refineries to be built there of 20,000,000 bbl. per year capacity, including 20 cracking units. Topping plants and cracking units are also under consideration for Moscow and Yaroslav.

Pipe Line Construction

THE Caspian Sea-Ukraine pipe line system for refined oil is at present well under construction. The link from Grozni to Armavir (10 in. pipe, entirely welded), as well as the connection from Mailkop to Armavir, are expected to be completed during 1932. New lines for the transportation of gasoline are contemplated between Baku-Batoum, and between Grozni-Touapse.

Production

FIGURES for the first quarter of 1931 were given in May WORLD PETROLEUM. Semi-official figures of the individual trusts for the period, indicate that Azneft was behind its quota mainly at Surakhany. Its losses are important from the point of view of quality, as the field supplies most of Azneft's sweet oil.

Grozni also was in arrears attributed to difficulties of transportation, which resulted in the slowing down of production, especially as there is a lack of storage facilities. Embaneft was below its quota due to reduced drilling activity caused by lack of equipment, also because of a breakdown of the compressor plant. Maikop is still under the grip of a field fire, and the fields of Middlasia were held back by frost that cut off the pipe line connection between the fields and storage.

Runs to Stills

GAS production in January and February amounted to 82,000 tons, or 132 percent of the plan. There was a material falling off in production of gasoline, due partly to the substantial reduction in production of light oils, and partly to the failure to bring sufficient cracking capacity under steam. Cracking for January amounted to 47,600 bbl. against 155,000 bbl.; in February 140,000 bbl., against 210,000 bbl. as required by the plan.

Percent of Plan Completed

	January	February
Crude production	95.7	90.0
Drilling (old fields)	86.5	72.8
Drilling (new fields)	64.8	72.8
Runs to stills	95.6	90.9
Production gasoline	93.2	83.9
Production kerosene	80.0	65.4

Figures versus Actual Data

THE quotas of the Five-Year Plan have been revised several times and the figures changed so often that it is almost impossible to ascertain the correct figures with which the actual data may be compared. The production quota set in 1928-9 as the aim for 1933, which is the last year of the plan, had been set originally at 147,000,000 bbl.; but was soon changed to 192,000,000 bbl. A further revision set the figure at 247,000,000 bbl. This, again, was changed subsequently to 331,000,000 bbl. Finally on January 23rd, 1931, the so-called "third variant" was substituted making the quota for 1933, 350,000,000 bbl. Last month we gave the scheduled production for 1934 as 450,000,000 bbl.; but this has just been increased to 462,000,000 bbl. The present rate of crude production, approximately 12,500,000 bbl. per month, does not in any way correspond with the quota of 192,500,000 bbl. for 1931. It is, however, in conformity with the 147,000,000 bbl. originally set for 1933 and hence the announcement of the Soviet Oil Trust that the Five-Year Plan has been completed in 2½ years.

A close examination of the various revisions shows that the original Five-Year Plan drawn up in 1928/29, had made ample provision for wildcatting and exploration of new oil areas, and quotas were set for production of these fields. Revisions gradually changed this policy; production quotas of new fields were reduced from time to time, and the production quotas of the main oil fields were proportionally increased with every revision. The following two variants illustrate such changes made in the quotas of production of the individual fields, with the only exception, Benoe, Dagestan, Kuban, and Tierskaya, which are entirely new fields, where drilling had been started recently.

Soyousneft Production Orders for 1932

	Original Estimate (Bbl.)	Revised Estimate (Bbl.)
Azneft	135,000,000	145,000,000
Grozneft	92,000,000	91, 000,000
Maikop—Included in Grozneft		28,000,000
Ural	14,000,000	3,500,000
Sakhalin	8,600,000	10,500,000
Embaneft	20,000,000	7,000,000
Middleasia	8,200,000	5,600,000
Turkmanneft	2,500,000	700,000
Gruzneft	2,750,000	2,500,000
Benoe	.....	10,500,000
Kuban	.....	5,600,000
Dagestan	1,400,000	2,800,000
Tierskaya	.....	7,000,000
All other	700,000	1,000,000

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ROUMANIAN OIL RESUMÉ

Roumania's latest gusher.

A BIG gusher brought in by the Prahova Company (AGIP) at Gura-Ocnitei, has raised Roumania's production by over 2,000 cars per day (140,000 bbl.). Contrary to all expectations, and in spite of the reduced drilling activity, the production of this country, which a short time ago had dwindled down to something like 125,550 bbl. per day, has again increased. While the Moreni field continues to decline, Boldesti and Gura-Ocnitei-Gorgoteni, are responsible for the increase, being at present the two most active fields in Roumania.

Prahova Company's well No. 14 once again proves the richness of the Gua-Ocnitei-Gorgoteni anticline. The well came in quite unexpectedly, and due probably to the thinness of the mud (1.3 density) and the big pressure of the stratum, it got out of control. Its production is estimated at about 14,000 bbl. per day.

Oil sprayed by the wind caused damages over a large area. The casing head was eaten away by the sand, rendering the task of getting the well under control extremely difficult and hazardous. The neighbouring wells of the Romano-Americana Company No. 13 and No. 18 with a daily production of about 3,850 bbl. each, were temporarily closed down on account of the danger. Prahova well is no doubt detrimental to the third Meotic sand from which it is producing. In some of the neighbouring wells the pressure has already dropped very much. Fortunately, the crew have been able to plug the well and avert the danger.

The extension of the Gura-Ocnitei-Gorgoteni anticline has been explored with considerable success by the Sondrum Company. Its exploration well No. 1 has met the first Meotic sand at 3,980 feet, and produces over 500 bbl. per day through a 6½ mm. bean, the pressure in the casing being about 120 atm. There is every indication that the third sand will be at least as prolific as that of Gorgoteni. The Sondrum well is at about two km. west of the producing wells of the latter field.

Other interesting results have been Sotanga (Astra-Romana), Doicesti (Astra-Romana), and Glodeni (Steaua Romana). All these places are situated at 8 to 10 km. northwest of the Ochiuri field. It is considered, however, that the value of this new region is much smaller than that of the extension of the Gura-Ocnitei-Gorgoteni anticline explored by the Sondrum Company.

As far as production is concerned, the attention of the two leading companies, the Astra-Romana and the Steaua-Romana, is concentrated on the Boldesti field where both companies drill very actively. Wells, there produce between 700-2,800 bbl. per day from depths ranging between 6,270 and 8,250 feet.

In spite of these depths the cost of drilling on this field has been very much reduced by the adoption of a single string of casing programme, applied for the first time by the Steaua-Romana.

As a natural consequence of the increase of production, prices of crude have dropped by about 40 percent in the last fortnight. The fall has been accentuated by the fact that Astra-Romana, which until lately had adopted a policy of restriction of production, buying on the open market the surplus of crude it needed, has dropped this policy by increasing its production so as to cover completely its needs. Consequently the largest buyer of independently produced crude on the Roumanian market has disappeared.

The price of Bustenari light crude has dropped from 7,000 lei to 4,000 lei per car, and the Moreni parafinous crude from 4,300 to 3,000 lei per car (of 70 bbl.). It is claimed that this drop in prices is the result of the policy pursued by the big companies. It may jepardize small independent producers, as well as small refineries now hampering successful conclusion of the Cartel for the domestic market. In any event the situation is very serious.

The change in the Government of Roumania cannot be expected to bring about any modification in its attitude towards the oil industry, as the Minister of Industry and Commerce remains the same as in the National Peasant Government. From his attitude one is tempted to draw the conclusion that Mihil Manoilescu is sick and tired of the Roumanian oil men. While shedding tears over their misfortunes, they are either incapable or unwilling to arrive at an understanding which would surely give them the means to exist.

During a thunderstorm which occured at Moinesti, the Steaua-Romana's refinery was set on fire by lightning, and completely destroyed. The refinery had a modern Bormann installation for treating paraffinous crude. It was situated near the Moldavian oil fields.

E. MARGULIUS.

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POLISH PETROLEUM INDUSTRY

Crude Production

WARSAW, JUNE

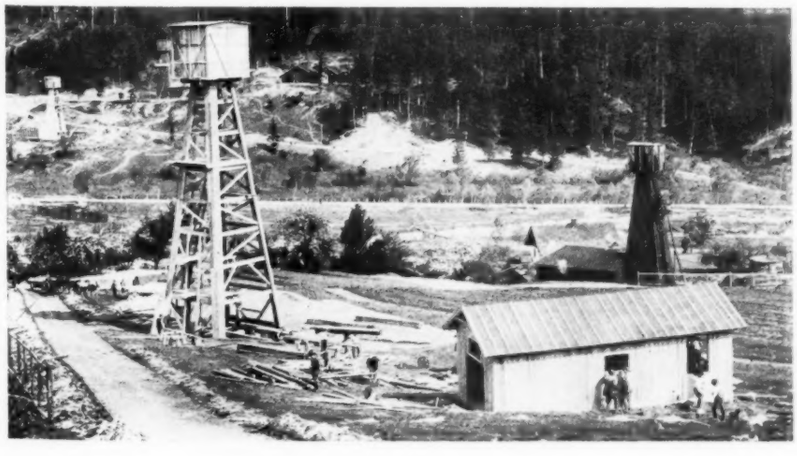
POLISH production of crude oil for the year 1930 amounted to 4,645,550 bbl., a slight decrease from 4,731,104 bbl. in 1929 production. The decrease from 1928 to 1929 production, however, amounted to 10 percent. Activity in the Jaslo, West Galicia district during 1929 more than balanced a reduction of 220,430 bbl. in Boryslaw production. The Boryslaw field, nevertheless, is still the greatest producer, its output being 3,003,345 bbl. in 1930.

Refining Industry

POLISH refineries treated 4,429,992 bbl. of crude oil, in 1930 against 4,590,992 bbl. in 1929. From this crude there were produced 928,897 bbl. of benzine, 1,340,247 bbl. of kerosene, 738,528 bbl. of gasoil and fuel oil, 632,324 bbl. of lubricating oil, 33,284 tons of paraffin, 18,185 tons of asphalt, 10,603 tons of coke, 3,257 tons of vaseline, and 24,879 tons of other products.

Consumption of petroleum products in the domestic market has fallen off considerably as a result of the economic crisis. Consumption of kerosene dropped 63,960 bbl. to 1,192,749 bbl. for 1930; consumption of lubricating oils amounted to 439,530 bbl., a decrease of 120,015 bbl. from the figure for 1929. On the other hand benzine consumption increased by 64,504 bbl. or 9.4 percent during the year, although in the last months of 1930 there was a decline in consumption.

One of Poland's oldest oil mines, and several new wells on the road from Boryslaw to Schodnica.



Exports

EXPORTS for 1930 amounted to 1,345,218 bbl. The decrease of 396,158 bbl., which this figure represents in comparison with 1929, is partially explained by the chaotic condition of the Roumanian industry with consequent low prices, and the Russian invasion of the Italian market. Only those exports designed for the North and West of Europe seem to be at all stabilized as shown by the fact that Sweden purchased 13,503 bbl., Letonia, 25,277 bbl., Finland, 70,931 bbl., and Switzerland, 110,425 bbl.

The decline in exportation, as shown in the accompanying table occurred principally in the central European countries.

Comparative Polish Exports to Central and Southern Europe during 1929 and 1930

	Exports in Barrels of 42 gal.	
Country	1929	1930
Czeckoslovakia	445,263	323,092
Austria	240,646	84,735
Germany	134,974	101,311
Yugoslavia	22,666	13,006
Hungary	24,283	15,323
Italy	29,183	10,801

Drilling and Gas Production

DURING 1930 no successful drillings were completed in new areas under exploration; but in view of general world overproduction, the decrease in domestic consumption and exports, this fact is not alarming.

Production of natural gas amounted to 489,000,000 cubic meters, an increase of 22,000 cubic meters, over production in 1929. From this natural gas was produced 327,403 bbl. of gasoline which is blended with benzine to make motor fuel.

Production of natural wax reached 901 tons for 1930.

M. BARTOSZEWICZ

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Book Reviews

CHEMICAL ENGINEERING AND CHEMICAL CATALOGUE, Seventh edition, (Lenord Hill Ltd. of London, publisher, 15/-). This useful publication consists of over 400 pages forming a complete catalogue of chemicals, plant, and engineering, with indices, tables, statistics, and bibliography.

One of the most important sections of this comprehensive catalogue is the technical and scientific book lists.

FINANCE

New York

AFTER establishing a new low for the bear market on June 2, quotations definitely reversed their trend on June 3. In spite of its internally demoralized state, the oil industry participated in, and may perhaps be said to have led the movement. One of the important items of news which apparently influenced the change in trend was the announcement by the Department of Justice at Washington, that it would not appeal to the Supreme Court from the decision of the Circuit Court of Appeals at St. Louis, which ruled that the contemplated merger of the Standard Oil Company of New York and Vacuum Oil Company would not be contrary to the Standard Oil dissolution decree of 1911, nor in violation of the anti-trust laws.

Two years ago, when the three for one basis of exchange was agreed upon by directors of the two companies, the stocks were quoted approximately in that ratio; but just prior to this announcement Vacuum was selling for less than two times the price of Standard of New York. The Department of Justice's decision caused an immediate 10 point rise in Vacuum and a more moderate percentage gain in Standard of New York.

AT the Shell Union annual meeting, President Van Eck stated that as of May 8 the company had $21,000,000 in liquid funds in comparison with $19,000,000 on March 31 and $20,000,000 as of January 31. He also stated that operating expenses this year expected to run several million dollars less than in 1930, and that capital expenditures this year have not been large and authorization of drilling expenditures was considerably below a year ago. The second quarter report is expected to show much smaller loss than the first quarter, when deficit of close $10,000,000 was sustained, the better showing being due to reduced expenses since general conditions in the industry were less favorable to profits.

MEXICAN Seaboard, which has recently voted to change its name to Seaboard Oil and Gas, reported consolidated net profit for the first quarter after all charges but before Federal taxes of $53,155, equal to about 4 cents a share. For the first quarter of 1930 earnings amounted to $291,539.

IT was disclosed at the annual meeting of Pan American Petroleum and Transport that company has disposed of its 16-2/3 percent interest in the Near East Development Company to Standard Oil of New Jersey, which now owns 41-2/3 percent control of that company. Standard of New York owns 25 percent, and the remaining 33-1/3 percent is divided equally between Gulf Oil and Atlantic Refining. It has been reported that Atlantic Refining may sell its interest to one of the two Standards; but this has not received any official confirmation. Pan American stated that it withdrew because it had no significant voice in the management of the Iraq Petroleum Company, Ltd., in which Near East Development holds a 23¾ percent interest, and because it was felt that economical handling of Pan American's expected proportion of Iraq crude production would require a disproportionate capital outlay.

As a result of Pan American's exceptional earnings showing last year, which was commented upon in this column last month, the directors felt warranted in declaring a 40-cent dividend on the common and class B common shares, payable July 20 to stock of record June 30. This is the first dividend the company has paid since 1927; but it was not designated as a quarterly payment and cannot be said to offer any definite assurance as to the time or extent of future disbursements. Standard Oil of Indiana owns more than 91 percent of the two Pan American issues, and will receive close to $1,300,000 out of this payment.

Mexican Petroleum Company, Ltd., Mexican subsidiary of Pan American, reported consolidated net profit for 1930 of $2,374,561, equal to $3.09 a share. This represents a sharp decline from the 1929 figure of $6,051,518, equal to $11.13 a share. Earnings this year are apparently continuing at sharply reduced levels, since quarterly common dividend that would have been due about July 20 has been omitted. On April 20 a $3 quarterly payment was made. Some years ago this stock was a speculative trading favorite on the New York Stock Exchange; but it is so closely held now that transactions are few.

New York Stock Prices

1931 High	1931 Low	Current Div. $ per Annum	Stock (Par Value $)	May 18 to June 20 Sales (Shares)	First	High	Low	Last	Net Change[1]
23⅝	11¼	1.00	Atlantic Refining (25)	72,300	14⅝	15⅝	11¼	15¼	+ ½
14½	5¾	1.00	Barnsdall "A" (25)	82,600	7½	7⅞	5¾	7⅜	— ½
3⅛	¾	....	Colon Oil (No)	9,900	1¼	1¼	¾	1	— ¼
12	5	....	Continental Oil (No)	153,000	6⅞	7⅞	5	7⅜	+1⅛
3½	2	....	Creole Petroleum (No)	21,200	2	2⅜	2	2⅛	+ ⅛
75½	38	1.50	Gulf Oil Corp. (25)	28,100	50	52¼	38	52¼	+2¼
72	49⅞	2.00	Humble Oil & Ref. (25)	33,700	52¾	56½	49⅞	56½	+3¾
18¼	9⅞	0.50	Imperial Oil, Ltd. (No)	54,500	11⅞	12½	9⅞	11⅞	— ⅛
4⅝	2	....	Indian Refining (10)	4,400	2⅛	2¼	2⅛	2⅛	+ ⅛
15½	8¾	1.00	International Petr. (No)	169,900	11	11½	8¾	10⅜	— ⅜
20¾	10⅝	....	Mexican Seaboard (No)	169,000	15	15⅜	10⅝	14¾	— ½
19½	7	....	Ohio Oil (No)	85,600	8¾	9¾	7	8⅞	+ ⅜
36½	24	....	Pan Amer. P. & T. "B" (50)	3,500	29	29	24	28½	—1⅜
16⅝	4¾	....	Phillips Petr. (No)	116,500	7	7⅛	4¾	6¾	— ⅜
20⅜	6½	....	Prairie Oil & Gas (25)	37,000	9¼	10	6½	9	— ¼
11⅞	5½	....	Pure Oil (25)	56,800	6¼	6½	5½	6¼	— ⅛
6⅜	1	....	Richfield Oil (No)	31,400	1¼	1⅜	1	1⅜	+ ⅛
42⅝	24⅞	†2.27	Royal Dutch (N. Y.)(13⅜)	63,200	28⅜	29½	24⅞	27½	—1½
10¼	4½	....	Shell Union (No)	59,700	4⅜	6⅜	4½	6	+1⅛
15⅞	6¼	....	Sinclair Consol. (No)	218,600	8⅜	9¼	6¼	8⅜	— ⅛
12⅞	3½	....	Skelly Oil (25)	18,500	4½	4⅝	3½	4½	— ⅜
51¾	31½	‡2.50	Standard Oil of Calif. (No)	154,100	35½	37½	31⅛	36⅜	+1
38½	19⅜	2.00	Standard Oil (Ind.)(25)	218,100	25⅝	25⅝	19⅛	25¼	— ⅜
23⅝	15⅝	1.60	Standard Oil (Ky.)(10)	39,400	17½	19	15⅝	18	+ ⅝
52½	30⅝	§2.00	Standard Oil (N.J.)(25)	418,200	34⅜	37	30⅝	37	+1⅜
26	13⅞	1.60	Standard Oil of N. Y. (25)	462,800	18	18⅛	13⅞	16	—2⅛
45¼	31	#1.00	Sun Oil (No)	5,400	34¼	34½	31	31½	—3½
36¼	18	2.00	Texas Corp. (25)	233,200	19⅜	21¼	18	20½	+1
9	4	0.60	Tide Water Assoc. (No)	58,100	4⅜	6⅛	4	6	+1½
26⅝	14	*2.00	Union Oil of Calif. (25)	41,300	16¼	19¾	15¾	18½	+2
69¾	22⅛	2.00	Vacuum Oil (25)	207,300	31⅞	41⅜	22⅛	39	+7¼
1⅞	⅝	....	Venezuelan Petr. (5)	6,200	¾	⅞	⅝	¾	— ¼

[1] Since close of last month's table. † Paid for 1930—no regular rate. ‡ Plus 2% in stock. § Including extras. # Plus 9% in stock. * Plus 4% in stock.

COMPLETE omission of common dividends by Sinclair Consolidated was not entirely unexpected since last year's regular operations showed no balance available for common and conditions this year have been even less favorable. Company is in very strong cash position; but conservative financial policy was deemed advisable for the ultimate good of stockholders. Early this year the dividend rate had been cut from $2 to $1 annually.

IT is reported that arrangements have been concluded whereby Mexican oil companies will advance to the Mexican government $13,000,000 on the security of future production and export tax assessments. It is said that $10,000,000 will be advanced immediately with further monthly payments of $400,000 until the end of the current year. It is understood that part of these funds will be used to meet urgent internal obligations, but that the major portion will be applied to furthering that country's program of highway construction. One of the companies reported to be involved is Standard Oil of California, through its subsidiary Standard Oil Company of Mexico, which is said to have been negotiating for advance payment of taxes to the amount of about $2,500,000.

STANDARD OIL EXPORT CORPORATION, subsidiary of Standard Oil Company (New Jersey), issued its first report covering the year 1930. Over 91 percent of total income was derived from dividends received from its marketing subsidiary in Great Britan, Anglo-American Oil. All of Standard Oil Export's common stock is held by subsidiaries of Standard Oil (New Jersey), but the preferred was given in exchange to former stock holders and enjoys a good market on the New York Stock Exchange. Anglo-American nineteen-thirty earnings were equal to $5.42 a share on the outstanding 5 percent preferred.

COLON OIL CORPORATION, subsidiary of Royal Dutch operating in Venezuela, reported for the eleven months ended December 31, 1930, a net loss, after intangible drilling costs, depreciation, interest and amortization charges, of $1,289,944, equal to about 59 cents a share on the 2,200,000 no par shares out standing. President Airey stated that during the first five months of 1931 production was built up to a point where it is hoped pipe line deliveries can be kept at approximately 200,000 bbl. daily without further drilling for the present. Production in 1930 amounted to 4,873,540 bbl. in comparison with 193,411 bbl. in 1929.

WE are pleased to record just as we go to press that announcement on June 20 of President Hoover's international debt moratorium plan brought a change in public psychology as affecting business and stock market sentiment that was electric in character in its swiftness and intensity. The rise in security prices, although tempered somewhat on June 25, and strong again on June 26, was almost sensational and furnished evidence of the depths of gloom that had previously pervaded the market. Recovery on foreign security exchanges was equally marked. Commodities were also immediately strengthened, huge buying of such metals as copper and lead being reflected in advance in metal prices of more than 10 percent. Although the oil industry is perhaps not a direct beneficiary of such a change in sentiment, since its major troubles are internal in character, the oil shares participated in the upturn to add a number of points to the best prices shown in this months tabulations. Standard of New Jersey sold above 41, Standard of New York above 18, Standard of Indiana above 28, Gulf above 61, and Vacuum at 44. It is of course too early to predict the extent to which this impetus can carry through in bringing the world out of the depression, but it is generally conceded that vitally important step in the right direction has been taken, regardless of any intermediate weaknesses that may develop from now on.

London: June

OIL share quotations in London have at last managed to stage something of a comeback. After a further decline until about the end of May, when many shares touched new lows for the current year, prices took a turn for the better. News from the United States of cuts in various products has been without much effect, the wind having been blowing in that direction for a considerable time. The cut in petrol prices of a penny per gallon had also been anticipated, and was largely discounted before it was announced. The principal reason for the firmer tendency is the evidence of financial strength provided in the accounts of leading oil concerns issued during the past few weeks, and the confidence of chairmen at annual meetings. Many shares have already achieved substantial recoveries, but the movement is erratic, and is due largely to covering by "shorts" on a narrow market. Investors will probably require better news regarding the world oil position before they are prepared to follow the rise.

[These notes were dispatched by our London correspondent prior to President Hoover's announcement on world debts. EDITOR.]

ALL the biggest oil concerns fulfilled market expectations by announcing substantial reductions in profit for 1930. Shareholders had been prepared for this by the lower dividends previously announced. Shell Transport and Trading appears to have suffered more than the others, its net earnings showing a de-

London Stock Exchange Prices

1931 High	1931 Low	Last Year's Div. % per Ann.	Share	May 15 to June 15 First	High	Low	Last	Change
9/16	1/4	3½	Anglo-Ecuadorian	1/4	11/32	1/4	11/32	+ 3/32
2¾	1 5/16	17½	Anglo-Egyptian "B"	1 9/16	1 19/32	1 15/16†	1 15/16†	— 1/4
2 13/32	1 13/32	15	Anglo-Persian	1 15/32	1 31/32	1 13/32	1 31/32	+ 1/2
5/8	9/32	15	Apex Trinidad (5s.)	5/8	13/32	9/32	13/32	+ 1/32
31/32	1/2	....	Attock	3/4	3/4	1/2	5/8	— 1/4
5/16	3/16	5	Brit. Borneo (6s.)	1/4	9/32	3/16†	9/32†	+ 1/32
7/32	3/16	6¾‡	Brit. Burmah (8s.)	3/16	3/16	3/16	3/16	.....
5/32	1/16	....	Brit. Controlled ($5)	1/16	1/16	1/16	1/16	.....
1/4	1/16	....	Brit. Controlled Pfd. ($5)	3/32	3/32	1/16	1/16	.....
3 5/8	2 1/16	22½	Burmah	2 5/16	2 7/16	2 1/16	2 1/32	+ 1/32
15/32	5/16	12c.	Canadian Eagle (No par)	11/32	5/8	5/16	11/32	.....
11/16	5/8	....	Creole (No par)	13/32	7/16	5/8	7/16	+ 1/32
5/32	1/16	....	Kern River (10s.)	1/16	3/32	1/16	1/16	.....
1 1/8	23/32	10	Lobitos	3/4	1 1/32	23/32	1 1/32	+ 11/32
17/32	5/16	6	Mexican Eagle ($4 Mex.)	5/16	11/32	5/16	11/32	+ 1/32
36½	25¾	40c.	Pan American "B" ($50)	30½	30½	25¾	30½	.....
3/4	5/32	2½	Phoenix	5/16	7/32	5/32	7/32	+ 1/32
26 5/16	15 7/8	17	Royal Dutch (fl. 100)	18	18½	15 7/8	16 3/4	— 1 1/4
3 27/32	2 1/4	17½‡	Shell Transport	2 5/16	2 11/32	2 1/4	2 5/16	.....
9/32	5/32	4	Steaua Romana	5/32	9/32	5/32	8/32	+ 1/32
1 15/32	1/4	7½	Trinidad Leasehold	9/32	3/8	9/32	3/8	+ 5/32
9/32	5/32	....	Untd. Brit. of Trinidad (6s.8d.)	5/32	9/32	5/32	8/32	.....
1 23/32	1¼	17½	Venezuelan Oil Concessions	1¼	1 15/32	1¼	1 11/16†	+ 3/16

Nominal value of shares £1 unless otherwise indicated by bracketed figures.
‡ Denotes tax-free dividend. † Denotes "Ex-dividend" price.
c. Denotes cents per share

cline of £1,584,634 to £4,898,752. Reduction in tax free dividend from a total of 25 percent to 17½ percent is equivalent to more than the decline in profits, but owing to the issue of new capital last year, preference dividend absorbs a larger sum than before. It appears from the balance sheet that funds provided by the preference issue were not fully employed in the business, pending the use of the new money in developing subsidiary interests.

ANGLO-PERSIAN trading profits fell back from £7,255,417 in 1929 to £6,542,-189 last year; but the latter figure is still nearly £2,000,000 higher than the 1928 earnings. Although the year's dividend has been cut from 20 percent to 15 percent, a further £1,050,000 has been added to various reserves, which now stand at a total of £8,458,129. Field developments as a whole were satisfactory, and the management has continued its policy of improving equipment.

STATEMENTS in the Burmah Oil Report, and by Sir John T. Cargill at the annual meeting, show that the Indian kerosene market is giving the directors a good deal of anxiety. This is discussed elsewhere in this issue. Despite working economies and larger income from investments, net profit was more than £700,000 lower at 2£736,013, and shareholders are receiving a total dividend of 22½ percent against 30 percent. Ample allowance was made for depreciation, and larger transfers to reserves.

FOLLOWING the ratification of the agreement between Iraq Petroleum Company and the Iraq Government, giving the former sole concessionary rights East of the River Tigris, news was received last month that preliminary work had actually commenced on the new 1,200-mile branching pipe-line from the Mosul field to Haifa and Tripoli. Almost simultaneously it was announced from New York that Pan-American Petroleum had sold its interest in Near East Development Corporation to the Standard Oil of New Jersey, leaving the latter, with the Standard Oil of New York, predominant in the American end of Iraq Oil. As the bulk of the Iraq Company's capital has already been expended on exploratory and development work, pipeline construction is expected to necessitate provision of a large amount of new money. This will have to be provided by the controlling concerns, including Anglo-Persian, Royal Dutch-Shell and French and American interests.

FULL accunts of Venezuelan Oil Concessions for 1930 confirm the deduction that the company has had a good year, drawn a month ago from the dividend statement. In accordance with the agreement with other Venezuelan operators, production was curtailed to 4,137,140 bbl. below the figure for 1929. Output, however, was drawn from selected wells so as to obtain the best return from the least expenditure, and outgoings were reduced by restricting drilling operations. Lower freights also contributed to keep down expenses, and the result was an advance of £175,091 to £1,260,757 in net earnings. The dividend of 17½ percent for the complete year, already announced, absorbs practically the whole of the profit, and after writing off £19,031, expenses of last year's new share issue, the undivided surplus is £178,097 compared with £195,-912 a year ago.

REPORTS recently issued by two important tanker companies show good results in view of the lower freights operative last year. British Tanker Company, the marine transport subsidiary of Anglo-Persian, reports profits of £918,410, a decline of less than £8,000 on 1929, and repeats the 6 percent tax free dividend. Tankers, Limited, increased its trading profits from £142,-843 to £203,739, and provided its preference dividend, at the same time making considerably larger allocations to reserves and depreciation. In the case of each company, however, special influences operated to keep up profits.

RESULTS of the "Twin Engle" companies were less satisfactory than the market had anticipated. Mexican Eagle reports a drop of $1,526,699 (Mexican gold) to $5,175,356 in trading profit, but repeats the 6 percent dividend on the ordinary shares. Profits of Canadian Eagle were larger, but after writing off the premium on Eagle Oil Transport preference shares purchased during the year, and providing for reserve against investment in and loan to Arend Petroleum, the balance is about $450,000 (Canadian) lower than for 1929 at $3,983,265. Expected increase in the ordinary share dividend was not forthcoming, 12 cents being again paid.

ANNOUNCEMENT of the dividend and profits of Lobitos Oilfields, Ltd.—a holding concern—provided the market with a pleasant surprise. A distribution of 5 to 7½ percent had been expected, but the company announced 10 percent, or only 2½ percent less than for 1929, net profits being £182,158 compared with £125,005. Substantial stock interest in the International Petroleum Company and in the Andian National Corporation are held by Lobitos Oilfields, which also has a large share interest in the Anglo-Equadorian Oilfields, Ltd., and owns the La Compania Petroleta Lobitos, producing in Peru, as well as six tankers. In 1930 the producing company attained its highest output, namely, 2,420,883 bbl. Without increasing its rigs a greater footage was drilled than in 1930.

ANGLO-EGYPTIAN Oilfields, a Royal Dutch-Shell subsidiary, produced satisfactory results last year, the improved plant and handling facilities recently brought into operation largely offsetting lower selling prices. Production reached a new high level at 1,942,892 bbl., and after a larger allowance for depreciation, net profit was £345,661 against £449,806 in 1929. The dividend of 17½ percent for 1930, although 5 percent below that for preceding years, was well up to market expectations, and the balance sheet showed a strong position, liquid assets exceeding current liabilities by £759,871. Eight new wells, of which seven were producers, were completed in 1930.

ALEC H. DAY

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Paris, May-June

LEGISLATION in France has complicated the whole petroleum situation to such an extent that the small distributing companies have been underselling the larger ones and vice versa, in the hope of increasing their importing licences. The five liter tin of gasoline recently fell to Frs. 7.75, whereas it used to stand at 11.75. All concerned have been loosing money—an average of Frs. 800,000 a day is spoken of in the Parisian area. For the whole of France, loses amount to roughly Frs. 3,000,000 a day.

An effort to establish law and order has just been made, and all companies have agreed to increase the price of gasoline by five francs an hectoliter in the provinces, and by ten francs an hectoliter in Paris.

CONTRARY to general expectation the S.A. Pechelbronn has just announced that, having been unable to obtain the

necessary administrative authorisations, stipulated by the decrees of March 23, 1929 and April 1, 1931, it will be obliged to postpone the increase in its capital of Frs. 49,000,000 that had been decided upon at the company's Extraordinary meeting held on May 6, 1931.

STEAUA FRANCAISE and Steaua Romana have both published favorable balance sheets for the financial year ended December 31, but once again no dividends are to be distributed.

As far as Steaua Francaise is concerned, a net profit of Frs. 8,456,403 is announced which, added to the balance carried forward the previous year, forms a total of Frs. 10,536,216 to be divided up as follows: Frs. 1,005,127 to legal reserve allocations, Frs. 7,000,000 to special reserve allocations (bringing the total of same up to Frs. 30,000,000,) and a balance of Frs. 2,531,089 will be carried forward.

Sales of petroleum products effectuated by the Steaua Francaise in this country last year, exceeded 2,625,000 bbl., but as the company's directors pointed out, prices obtainable at the end of the year have diminished by 50 percent and sometimes even more. The company's capital now stands at Frs. 115,000,000; it has paid no dividends since 1928.

STEAUA ROMANA on the other hand reports a gross of Lei. 957,000,000 and a net profit of Lei. 40,000,000, as compared with Lei. 26,900,000 the previous year. Together with Astra Romana and Romana Americana it was prominent among Roumanian companies making strenuous efforts to reduce overproduction by adopting a system of proration, which unfortunately was not successful as Steaua refused to continue curtailment. Steaua's production, however, during May was considerably higher than that of April, namely 621,-600 bbl., against 481,103 bbl.

LIKE most other distributing companies in France the Societe Generale des Huiles de Petrole is faced with the necessity of halving its annual dividend, and will only pay Frs. 20. Earnings for 1930 were considerably less than those of 1929 — namely, Frs. 82,170,619 against 90,502,043—whereas the company's general expenses have increased. Net profits only amount to Frs. 9,026,-872 against 24,360,570 in 1929. When the S.G.H.P. holds its general meeting on June 18 shareholders will be called upon to give their consent by vote to the erection of the new refinery at Lavera, to the issue of fresh obligations, or as an alternative to leasing certain sites and plants, belonging to the S.G.H.P., to another refining company.

NO solution has yet been found to the problem of the Credit General Des Petroles' present financial difficulties (mentioned in our March issue, page 252.) The negotiations which had been undertaken with different French banks in view of floating the company again have not been successful, and it now becomes apparent that further difficulties are arising.

About to reconstruct its refinery at Frontignan the Compagnie Industrielle des Petroles announces a net profit of Frs. 10,837,729 for 1930. This compares unfavourably with the results obtained in 1929 which amounted to Frs. 10,016,904 for an exceptional financial year of eight months duration. It is possible that the C.I.P. will maintain a dividend of Frs. 40.

NOT very long ago the S.A. Creditul Minier ranked among the most important producing companies in Roumania. Difficulties and adverse circumstances have, however, somewhat arrested the company's regular development, and profits for 1930 are considerable less than those for 1929. It is true that falling prices are largely responsible for this state of affairs; but on the other hand overhead expenses having been reduced by Lei. 100,000,000, profits should have made a better showing.

In 1929, Creditul Miniers' gross profits amounted to Lei. 732,000,000; in 1930, Lei. 540,000,000 were barely attained, a sum of Lei. 143,000,000 was put aside for amortization against Lei. 255,000,000 the previous year, and expenses were reduced from Lei. 363,000,-000 to Lei. 258,000,000. The net profit of Lei. 45,000,000, announced consequently compares unfavourably with that of Lei. 31,000,000 reported the previous year.

Creditul Miniers production for the months of March and April, 1931 figures out at 483,266 and 423,808 bbl. respectively.

E. J. ANDRE.

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TRENDS IN THE FOREIGN TRADE OF THE UNITED STATES, (National Industrial Conference Board Inc., publishers, $3.50).

This book is a carefully prepared analysis of the foreign trade of the United States dealing with a comparison of prewar and post-war conditions in an effort to determine the future trend of world trade, and the importance of the international activity of the United States. While it is generally understood that since the World War the United States has come to play a different and more important part, the significence of this change, its importance to the country, and its future direction are considerably clarified by the comments and statistics of which this valuable work is composed.

Of particular interest to those in the oil industry are several sections devoted to United States petroleum exports and requirements.

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All fuel for military aviation purposes must be derived from domestic shale deposits, is the order recently given by the Esthonian Minister of War.

Paris Bourse Prices

1931			May 15 to June 12				
Div.	Par	Share	First	High	Low	Last	Change
30 lei	500 lei	Astra Romana	95	97	92	94	— 1
.....	500 lei	Colombia	72	72	67	67	— 5
50 lei	500 lei	Concordia	61	62	53	53	— 8
.....	500 Fr.	Cdré. Gén. des Pétroles act	....	....	....	....	....
.....	.....	Cdré. Gén. des Pétroles part	....	950	900	850	....
.....	500 Fr.	Franco Pol. Pétroles act	54	54	50	52	— 2
.....	.....	Franco Pol. Pétroles part	....	....	....	....	....
1 $	10 $	Franco Wyoming	266	266	212	219	— 47
40 Fr.	500 Fr.	S. G. des Huiles de Pétroles act	352	362	285	291	— 61
.....	.....	" " part	133	140	124	....	....
.....	500 Fr.	C. Française des Pétroles	....	....	....	....	....
.....	500 Fr.	C. Industrielle des Pétroles	814	835	790	800	— 14
70 Fr.	500 Fr.	Lille Bonnières Colombes prio	885	885	760	770	— 115
45 Fr.	500 Fr.	" " ord	695	695	500	510	— 185
.....	500 Fr.	Malopolska act	....	38	29	29	....
.....	.....	Malopolska part	....	135	135	141	....
.....	.....	Mexican Eagle	45	45	38	45	....
.....	250 Fr.	Omnium Inter. des Pétroles	111	111	100	103	— 8
50 Fr.	500 Fr.	Pechelbronn	697	697	630	605	— 92
60 Fr. B.	500 Fr. B.	Petrofina	485	485	432	454	— 31
240 Fl.	1000 Fl.	Royal Dutch	22,600	22,600	19,700	20,550	—2050
24 Fl.	100 Fl.	Royal Dutch 1/10	2280	2280	1990	2070	— 210
.....	1 £	Shell	362	362	274	290	— 72
25 Fr.	500 Fr.	Steaua Française	150	164	150	164	+ 14

SHIPPING

London: July

WITH the exception of the Black Sea market, the charter market generally continues in a depressed state. This naturally is having a derogatory effect upon the placing of new contracts. There are at the moment a number of very interesting tankers launched, completing and running trials. The Anglo-Saxon Company's program of 30 ships is now in the launching stage, and will be completed before the end of the year. Meantime the work is providing very welcome employment for a number of European shipyards. It was announced, for example, when the GOLDSHELL, one of the 11,500 ton German-built units of this program, was launched recently at the Bremer Vulkan yard, Vegesack, that the vessel had cost over 3,500,000 marks. To date her construction has provided six month's employment for between 800 and 1000 men. The Anglo-Saxon Company's orders have been of the greatest value to the German shipbuilding industry at a time when the shortage of orders in German yards is very acute. The other two German vessels are under construction at the yards of the Howaldtswerke A.G., Kiel, and the Deutsche Werke, A.G., Hamburg.

Of the total of 20 ships of 11,500 tons placed under this program in British, Dutch, German and Italian yards, all are motorships, and all but two are fitted for propulsion with Werkspoor four-cycle super-charged Diesels. At the close of the year 1930, according to the recent Royal Dutch Company's report, Anglo-Saxon had at its disposal 2,261,903 tons carrying capacity, including chartered tonnage, and during the year 19,911,250 tons of oils were transported.

Important Launchings

HARLAND AND WOLFF, who were successful in securing some of the British orders in the Anglo-Saxon program, are unique in that they are the only shipbuilders in the whole group who were able to persuade the owners that their own Diesels, namely Harland-B and W., rather than Werkspoor Diesels, should be used. CLIONA one of the vessels built under this order, was put in the water from their Govan yard in the middle of May. With the exception of her machinery she is similar to the rest of the ships of the fleet, being built on the combined longitudinal and transverse system of framing. The high speed of this ship, in association with the speed of her sister vessels, will undoubtedly go a long way towards revolutionizing bulk oil transportation.

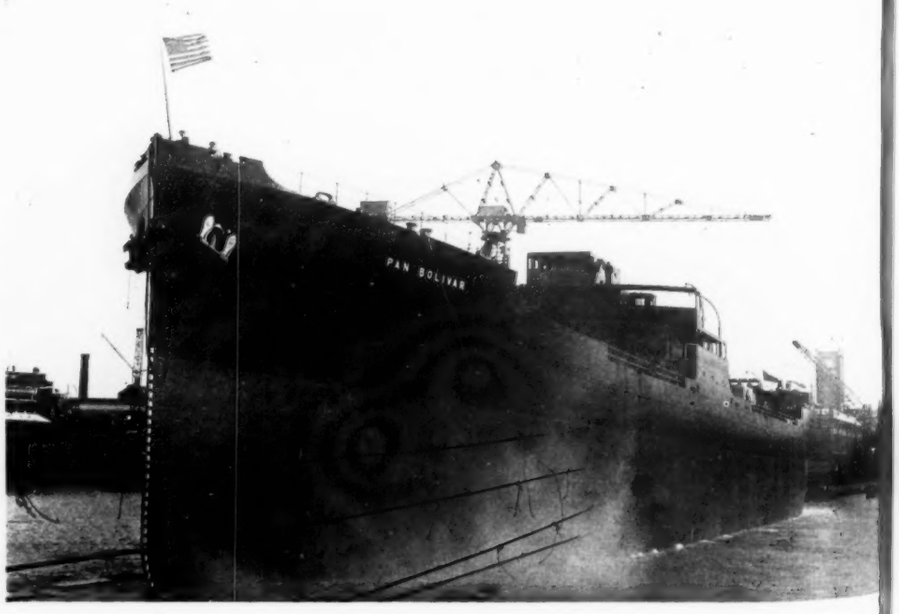
Towards the end of May, Swan, Hunter and Wigham Richardson launched into the Tyne a sister ship (in all but machinery), the CARDITA. In Sweden, the Götaverken are still busily engaged in completing large tankers, and towards the end of May finished the 13,750 tonner, BARFONN. This ship is described as a "convertible" tanker, in the sense that she can carry either clean or dirty cargoes. She has been built for Norwegian owners, and is a sister ship to the NIKE, CLARONA, VELMA, and G. C. BROVIG, all of which have been turned out by the Götaverken within the last two years. The trial trip of the BARFONN is the sixth from this Swedish yard this year. Five days after the BARFONN ran her trial trip, the 13,350 ton tanker ANNA KNUDSON was launched. She is a sister ship to the KAIA KNUDSEN completed earlier this year.

It is not only large tankers which are now completing; but there are a number of small vessels launched and fitting out. By the time this appears in print Harland and Wolff will have delivered the steam tanker MARACAY. She was launched in May, and was actually the second tanker to be put into the water by the builder within the space of a week, and is the twenty-first tanker of this type built at Belfast for American owners for Caribbean service. She is, however, slightly larger than the previous vessels, her dimensions being 350 ft. by 60 ft. by 17 ft. 6 in. depth moulded, with a gross tonnage of 3840.

Another small steam tanker which has recently been put into the water is the BRITAMOLINE, the second of two vessels built by the Furness Shipbuilding Company for the British-American Oil Company for service on the Great Lakes of North America. This ship, together with a sister ship now building, had the unique distinction of having been ordered by transatlantic telephone. She carries about 2800 tons on Great Lakes "Canaller" dimensions.

Swan, Hunter and Wigham Richardson have put into the water on the Tyne the steam tanker PAN BOLIVAR. This tanker has a carrying capacity of about 14,000 tons in ten main holds subdivided by a centre line bulkhead, with summer tanks in the tween deck wing spaces. She has been built for the Pan-American Petroleum and Transport Company of New York.

Her propelling machinery is unusual in these days, as the majority of large ocean-going tankers are Diesel driven.



Launch of the latest ocean tanker for the Pan American Petroleum and Transport Company of New York.

It comprises a triple-expansion steam engine with a special Bauer Wach low-pressure turbine installation coupled to the main shaft through double reduction gearing and a Vulcan hydraulic clutch. There are three single-ended Scotch boilers supplying superheated steam at a pressure of 220 lb. per sq. in. This relatively new development as far as tankers are concerned may be compared with the high pressure steam developments carried out by the Federal Shipbuilding Company, Kearny, N. J., for some tankers recently completed for the Standard Transportation Company.

Burmeister and Wain, the Danish shipbuilders, are now building the 11,100 tonner, NOREG, for H. M. Wrangel and Company of Haugesund, Norway. This ship is a twin-screw tanker with B. and W. Diesels, having a combined output of about 4,000 i.h.p.

New Tonnage and Charters

BURMEISTER AND WAIN recently secured a contract from the Jolund Steamship Company of Moss, Norway, to build an 11,500 ton motor tanker for delivery in August-September next. This ship has been chartered for ten years to the Anglo-Saxon Petroleum Company at the rate of £3,784 per month for the first five years and £3,644 for the second five years.

An interesting charter fixture, showing one of the few forms of transportation for which tankers can be used other than their own particular work, is worth mentioning. This was the departure of the tanker CHARLES E. HARWOOD of the Pan-American Petroleum Company from Cristobal with a cargo of 1,500,000 gal. of drinking water for discharge at Curaçao. This water is stated to have been purchased by the Dutch Government from the Panama Canal authorities in order to relieve the then existing acute water shortage at Curaçao.

Every month tankers take 20,000 bbl. of drinking water and 135,000 bbl. of refinery and laundry water to the neighboring island of Aruba,—see WORLD PETROLEUM, page 213, May, 1930. Attention is called in this connection to the fact that some time ago a cargo of 835,000 gallons of drinking water was shipped at Cardiff by the motor tanker VIGIDIS for use in the whaling fleet in the antarctic.

There is practically no enquiry for new tonnage in Great Britain, and the business which it was hoped that Russian Oil Products would place in the near future has not so far materialised.

Construction in Italy

The Cantieri Riuniti del Adriatico, which is owned by the Cosulich interests at Monfalcone, has at present under construction some 229,730 tons of shipping including two tankers of 11,500 tons for Norwegian owners, one 11,000 tonner for the Anglo-Saxon Petroleum Company of London and three 16,200 tonners for the Standard Shipping Company of New York.

A. C. HARDY.

LONDON MARKET REPORT

THE mineral oil market generally continues depressed, and there is no apparent indication of any immediate improvement. Since the general drop of 1d per gallon in the price of motor spirit, which took place on May 22 last, there have been rumours of a further drop; but, up to the present, no such reduction has to be recorded.

On May 7, a Government tax of 4d per gallon was imposed on motor spirit in the Irish Free State,—the tax now in force in England, Wales, Scotland and Northern Ireland is 6d per gallon.

The price of gas oil was reduced by ¼d per gallon on May 8 last.

MOTOR SPIRIT: Wholesale prices, delivered in bulk are as follows:

	Aviation	No. 1	No. 3
England and Wales and South Scotland	1/6½	1/2½	1/ ½
Belfast Zone	1/7	1/3	1/1
Rest of Northern Ireland	1/7½	1/3½	1/1½
North Scotland	1/7½	1/3½	1/1½
Dublin Zone	1/4½	1/ ½	10½
Rest of Irish Free State	1/5½	1/1½	11½

Wholesale prices in 2-gallon cans: Aviation and No. 1 1d and No. 3 1½d per gallon above bulk prices, except in Irish Free State and Northern Irleand where they are 2d per gallon more.

The above prices include the Government tax of 6d per gallon in England, Wales, Scotland and Northern Ireland and 4d per gallon in the Irish Free State.

KEROSENE: Water white, 8½d per gallon, and standard white, 7½d per gallon, in bulk, for London and home countries; rest of England and Wales, ½d per gallon more; barrelled oil, ex wharf, 3d per gallon above bulk prices for both qualities.

GAS OIL: In rail tank car loads, i.e. 10 ton lots 3½d per gallon, and in smaller quantities of 1,000 gallons and upwards 3¾d per gallon, nett and naked, ex wharf.

LUBRICATING OILS: During the last two weeks no alternations in prices have been recorded—Current quotations:—American sales £9/10/- to £21/-/-, American reds £10/7/6d to £15/10/-, American dark cylinders £9/12/6d to £21/10/-, and American filtered cylinders £16/-/- to £19/12/6d per ton, less 2½ percent, barrels free, ex wharf.

FUEL OILS: Furnace fuel oil £3/7/6d per ton, in bulk, ex ocean installation, for inland consumption, for bunkers the price is the same, i.e. £3/7/6d per ton. Diesel fuel oil £4/-/- per ton, in bulk, ex ocean installation, for inland consumption, for bunkers the price is 2/6d per ton dearer, i.e. £4/2/6d, and Diesel fuel oil £3/15/- per ton.

The foregoing information was supplied by Benjamin and Company of London, England.

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Mexican Oil Activities

Russian Gasoline

MEXICO CITY

ACCORDING to reports received from authentic sources a company capitalized at $5,000,000 has been formed for the purpose of flooding the Mexican market with Russian gasoline. The object of the company is said to be selling Soviet gasoline at the bargain rate of nine centavos (four and a half cents) per liter. Other than this, details of the nature and nationality of the company are lacking.

Considering that companies at present established in Mexico claim that they make but scant profit selling gasoline at 20 centavos (approximately 10 cents), the bargain price at which Soviet gasoline is to be sold, according to the report, is likely to prove a serious blow to the Mexican gasoline industry.

Government Revenue

ANOTHER decrease in revenue from petroleum production and exportation taxes was registered during April, according to figures of the special taxations department of the Ministry of Finance giving 290,805.60 pesos (about $145,202, U. S.) as the total Federal Government income from these sources during April. Of this amount, 219,485.55 pesos were for production, and 71,320.05 pesos for importation.

Government's income for April from gasoline production taxes was 1,170,040.78 pesos (approximately $585,020, U. S.), against 1,444,877.57 pesos during March.

Exploration

WHAT promises to be one of the greatest petroleum wells encountered in Mexico in recent years, has been brought in about 25 kilometers from Ciudad Reinosa, Tamaulipas state, a short distance southwest of Matamoros, on the American border. The well, which has an initial daily production of 10,000 bbl., was brought in at 3,750 feet by Mercedes Petroleum Company on lands owned by the Compañia Explotadora y Fraccionadora de los Bajos del Rio Bravo.

The well is known as Rio Bravo No. 2, and is in the Rio Bravo tract of Tamaulipas State, an area of some 1,000,000 acres. Transcontiental Petroleum Company, which holds about 250,000 acres in this tract, recently brought in a well near Reinosa. That well produced much gas, but indications were such that the company decided to sink the well deeper.

Mercedes Company proposes to sink an additional five or more wells in the territory.

A concession without a time limit has been granted the Coahuila Consolidated Coal Company, a large Coahuila state mining enterprise, by the petroleum department of the Ministry of Industry, Commerce, and Labor, for petroleum explorations on 85.659 hectares in Sabinas municipality, Coahuila state. If these explorations are successful, a new oil zone will be developed in north central Mexico.

Labor Laws

A TESTIMONIAL protesting enactment of the new labor laws, now being considered by the Federal Government, has been submitted by several employers' associations to the Government. H. N. Branch reviews the decrease in Federal revenue from 85,980,144 pesos (approximately $42,990,072) from taxes on the petroleum industry in 1921 to 8,913,296 pesos (approximately $4,456,648) for 1930. Petroleum taxes represented about 30 percent of the government income in 1921 against 3 percent in 1930.

IN a special interview with WORLD PETROLEUM'S Mexico City correspondent, Anita Brenner, noted writer, explained that while neither she nor her husband were sufficiently familiar with geology to determine whether oil was present in commercial quantities, she confirmed the report published last month that the presence of numerous seepages in southwest Guerrero and northwest Oaxaca States indicated that this territory would be well worth exploring. The area explored is 50 miles from the Mexican Pacific coast in a difficult and mountainous region.

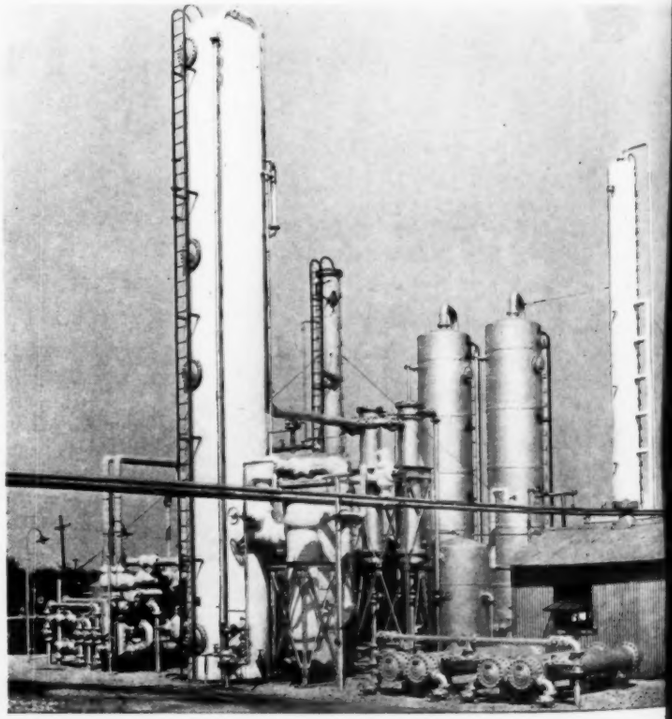
Refinery Construction

VAPOR-PHASE cracking units are being erected at Tampico and Minititlan refineries of the Mexican Eagle Oil Company. Technical difficulties have delayed completion of the Tampico refinery unit, but it will soon be in operation.

$10,000,000 Loan

REGARDING the rumored $10,000,000 loan to be made by petroleum companies operating in Mexico to the Federal Government, no definite action has yet been taken, only one company showing any considerable interest in the negotiations.

DOUGLAS GRAHAME



Natural gas absorption plant constructed in Oklahoma City oil field by Jackson Engineering Company